BLUEBOOK

JUNE 1942



Le Plond Lather in War or Peace . . .

are dedicated to low cost, high speed, precision turning. Just as highly efficient LeBlond Lathes are now helping speed our victory, so also will they aid in the speedy production of more goods for more people at less cost in the peace that will follow.

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI, OHIO Largest Manufacturer of a Complete Line of Lathes



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There's no double handling of stock cut from bars at the Pratt & Whitney plant; no intermediate operations, no equipment tied up with slow cutting-off methods. Pieces, no matter how man; come from the stock room in slices or lengths ready for machining, because cutting-off has been made a stockroom operation by the new heavy duty, high speed MARVEL No. 9A Automatic Hack Saw with automatic bar push-up.

Hack Saw with automatic bar push-up.
Full length bars lift directly from storage racks to the bar pushup. With a few simple adjustments and the push of a starter
button, pieces begin piling up at almost unbelievable speed,
accurately out off from large or nested bars. While the stock
keeper attends to his many other duties, this large capacity,
all-ball-bearing sawing machine AUTOMATICALLY feeds,
AUTOMATICALLY measures and AUTOMATICALLY cutsoff identical pieces, stopping AUTOMATICALLY at any predeterwinsed routs. mined point.

Moreover, by simply disengaging the belt on the bar feed, a "production" run can be stopped at any point, a miscellaneous cat made, and automatic "production" work resumed by reengaging the bar push-up.

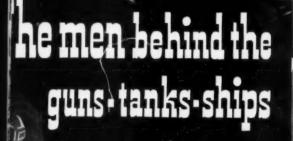
MARVEL Production Saws, No. 6A and 9A, are today's fastest,

most economical means for accurate cutting-off.

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Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

34,000 This Issue

Volume 38, No. 6

JUNE 1942

Featured in This Issue	41
Editor's Page	43
Production Engineering in the War Program	45
The Human Factors in Morale Building Training Within Industry (Part 4) By Edmund Mottershead	57
Community Sub-Contracting	81
Wire Retainers and Snap Rings By H. F. Williams	99
Conservation Control By Merrill Ormes	113
Motor Maintenance	119
Carbide Tools on Large Machines By Fred W. Lucht	129
Huge Expansion in Arc Welding	141
Sanding Away Production Bottlenecks	151
"Let's Talk Shop"	161
"Tooling Up" for Victory	183
Plants for Sub-Contract Work	208
Mechanics Through the Ages	216
BLUE BOOK Buyers' Service	318
Index to Advertisers 353-	355



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R. C. Van Kampen, President J. E. Hitchcock, Vice President M. L. Yonts, Secretary & Prod. Mgr. Wesley G. Paulson, Editor C. E. Elxinga, Circulation Mgr. Representatives
W. E. Hoffman, Portland, Coon.
A. E. Wailes, S5 W. 42nd St., N. Y. C.
D. B. Trott, 2187 Olive Ave., Lakewood Ohio.
R. H. Deibler, 2461 Sleepy Hollow Drive, Glendale, Cal.
Richard J. Fernease, 506 S. Dearborn St., Chicago, Ill.

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IN 1835 Asahel Hubbard rode home astride a fine white horse. The horse was a gift from grateful citizens of St. Louis, where Mr. Hubbard had installed a rotary pump to assure the first continuous supply of water to the town. This pump he had transported more than a thousand miles by raft and ox cart, after designing and building it in the Vermont shop, of which today's Jones & Lamson Machine

Company is a direct successor.



Jones & Lamson Automatic Thread Grinder Model TG-615







id a job for YOU!

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TOOL ROOM AND MANUFACTURING MILLING MACHINES ... SURFACE BROACHING MACHINES ... CUTTER SHARPEN

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Left - The CINCIN-NATI No. 2-18 Plain Automatic Milling Machine. Both styles of machines are available in 18" and 24" table travels.



Right — Milling a machine gun part on a CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine.



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During the gray days of the past decade, many people believed that machines were one of the chief causes of unemployment. In 1939 Continental published "Machines and Progress", a panoramic wall chart 5 feet long and 2 feet high, matching mechanical development through the years with employment figures. This study shows that machines are in reality the stepladders to higher standards of living. There are still a few of these charts on hand, if you'd like to have one.

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Before there was too great a scarcity of mechanics and tool makers, Continental made a bold bid to young men everywhere to swap their frayed white collars for honest, money making overalls. They published "12 Easy Lessons In Machine Shop Practice". This illustrated study course was distributed to schools, Y.M.C.A.'s, Boys Clubs, and hung in factories from coast to coast. It became so popular that it had to be reprinted this year. Would you like a copy?

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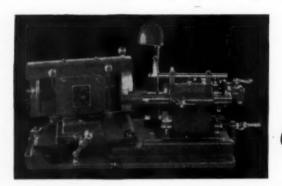
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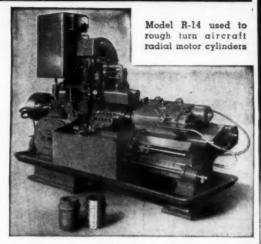
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OPERATION

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Had ample air supply. Called in the Rotor Analyst for unbiased opinion on AIR vs. HIGH-CYCLE grinders.



SCORE

AIR out-pointed HIGH-CYCLE (and the semi-finalist, flexible shafts) these ways:

- Increased production 10% compared to former type of grinders.
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- 3 Easier to handle. Their Rotor AIR grinders weigh only 9 lbs., compared to 12 lbs. for HIGH-CYCLE grinders. Made possible greater maneuverability and smoother grinding for this light-duty work.

Purchased 5 Rotor Powerplus AIR Grinders-and reordered two more recently.

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The Rotor Analyst has 65 different AIR tools and 59 different HIGH-CYCLE tools with which to solve your problems.



ROTOR TOOL

NU LOOP OF ALL

CLEVELAND OHIO

UNBIASED ANALYSIS OF PORTABLE TOOK PROBLEMS

In times like these, it's very important to Select the RIGHT MOTOR tor every application—

WAGNER motors may be broadly divided into three general classes; polyphase, single-phase, and direct-current. The following outline shows the various subdivisions and the Wagner type letters which

L Polyphus

- A. Squirrel-Cage Rotor

 1. Low resistance Type RP-1
- 2. High reactance Type RP-5
- 3. High resistance Type RP-4, RP-7
- B. Wound Rotor

 I. Low resistance Type RS

2. High resistance Type RT

3. Synchronous Type RN

- 2. Single-Phote
- 2. Single-Phase A. Wound Rotor
- Repulsion start Type RA
 Repulsion-induction Type RG
- B. Squirrel-Cage Rotor
- 1. Capacitor-start Type RK 2. Split-Phase-start Type RB
- 3. Direct-Current
 A. Wound Rotor
 I. Compound-Wound Type RD
- Polyphase Squirrel-Cage

Low-Resistance (1/6 to 400-hp)
Because of its simplicity, rugged construction, and

low cost the RP-1 motor is the most ensuiter treat

these motors will not permit the flywheels to deliver enough of their stored energy during the punching or drawing operation. For these applications Wagner builds RP-8 motors with high-resistance rotter. Durlag, the working part of the cycle, the motor speed drops considerably and allows the flywheel to do its work. High-resistance rotters are also used in RP-7 (I to Sel-4) elevator motors, which are used on lowspeed devators, holists, durn's walters, etc.

Polyphase Wound-Rotor Low-Resistance (1 to 250-hp)

There are two reasons for the existence and application of motors of the Vagner type RS. First, since the rotor winding is connected to allo-rings making it easy to connect a high seternal resistance in the rotor circuit. It is possible to obtain extremely low startingcurrents without impating the running performance. Second, by introducing resistance in the rotor circuit of an RS motor it is possible to obtain speed from \$8 to \$75 of tynchronous apped. This method of speed control is satisfactory when the load is constant. For obtaining different speeds on applications where the load warles, Wagner recommends the use of polyphase squirel-cage multi-apped motors, type MRP, which

Polyphase Wound-Rotor High-Resistance (40 to 100-hp)

may be obtained with two, three, or four speeds.

Single-Phase Wound-Rator Repulsion-Start (1/8 to 15-hp)

For single-phase circuits there is, no better motor than the Wagner RA repulsion-start induction motor, which starts as a repulsion motor with high startingtorque and one starting-current, and, upon approaching operating appead, is automatically converted into an induction motor. With few exceptions, if singlephase current is involved, the RA motor is the logical choice.

Single-Phase Wound-Rator Repulsion-Induction (1 to 5-hp)

Filling-station compressors are often operated in cold focations under washer conditions which congest the load out in the compressor cranicose and may increase the load until it is double its normal value. For such applications Wagner produced the for for motor which is a plications Wagner produced the for comour which is a heurb-riding machine with a squirrel-cage to limit the idle speed. This type of motor will carry any load which it can are and is ideal for filling-station compressor applications.

Single-Phase Squirrel-Cage-Rotor Capacitor-Start (1/6 to 1-hp)

High-Reactance (1-1/2 to 125-hp)

Some applications require motors of higher startingtorque than obtainable in RP-1 motors. Typical exfrigerating machinery, mixers, etc. For such applicaamples are crushers, plunger pumps, belt conveyors starting under load, large air compressors, large retions Wagner builds a high starting-torque motor with high-reactance rotor, known as type RP-5.

Polyphase Squirrel-Cage

The motors discussed thus far are not suitable for High-Resistance (1/2 to 150-hp)

high-resistance secondary winding which is pern nently short-circuited.

Jolyphase Wound-Rotor

Synchronous (7-1/2 to 200-hp)

Wagner Synchronous "Fynn-Welchsel" motors, type RN, differ from conventional synchronous motors in devices. The RN motor is the ideal motor to install only improves the power factor but also handles the that they have starting characteristics like RS motors, do not have separate exciters, and have simple starting where power factor needs correction because it not toughest job to be found. speracing machines having heavy flywheels because

of acceleration is short. The RB-\$ (1/6, 1/4 and 1/3-hp) chines, mangles, etc., which operate only for a short period of time at infrequent intervals. The RB-5 motor should not be used on jobs which operate continutions where the starting duty is light and the period is a special service motor intended for washing ma-

Direct-Current Wound-Rotor

Compound-Wound (1/6 to 3-hp)

Wagner also builds direct-current type RD motors,

which are still required in some locations.

M42-9A

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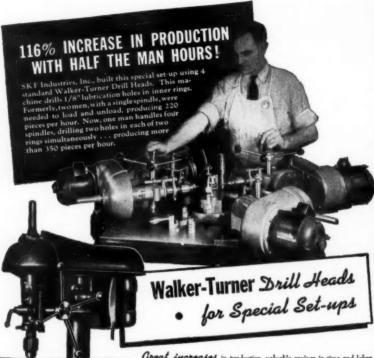
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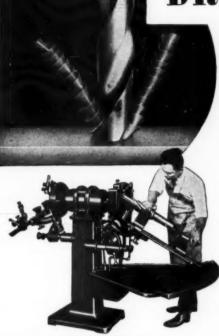


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Free-cutting magnesium permits use of overlength shanks which reach into deep holes and out-ofthe-way corners.

For free chip clearance, choose burs with few flutes, each ground extra-deep; give : cial attention to rake angle.

Special heat treatment of blan should be supplemented by "I mond Blue" heat treatment at grinding and after resharpenin Bur at speeds between 4500-70 R.P.M., depending on bur size

Your careful conformance to the basic rules will be rewarded by clean efficient burring, reduced spoila longer bur life — all essential to war effort. For detailed counsel any specific job in this relatively n field of metal working, write Kell flex Sales Department.



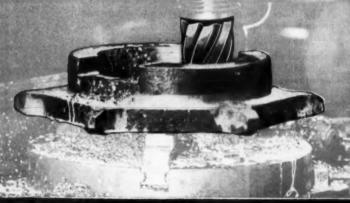
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A Pittsburgh manufacturer of gears now uses Putnam Hi-Speed End Mills exclusively. In reporting on the performance of these tools, this company states that it finds them "very satisfactory" for its various production milling operations.

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In war production plants everywhere, the DoAll
is doing an outstanding grinding job on three counts
—speed, smoothness and extreme accuracy.

The above view taken in an Ohio plant shows a production set-up of 50-caliber bullet dies, one of many difficult jobs handled on the DoAll.

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Are attacking mountains of munitions parts with the ferocity of a mosquito boat after an enemy fleet. They are very versatile and are quickly adaptable to production work on the thousands of small precision parts now so vital to our Victory Program.

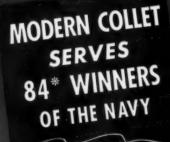
They do end mill work with end mills up to 5/8" in tool steel with amazing speed and accuracy.

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It is significant that the Modern Collet and Machine Company produces replacement parts and tools and rebuilds machines for practically all of the Navy "E" winners who use screw machines in their regular production.

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"Harry the Works Manager couldn't believe it."

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"Yes sir, I says. We know how to do it now. We grind our tools carefully every 80 pins, and we're careful to use those special loose bond grinding wheels on our wet grinders. That way, we average 10 regrinds and 800 pins to a tool. Than we cut off the end of the tool, cut a rabbet across it and braze on a new KENNAMETAL tip with silver solder. We do that three times before the shank is too short. That makes 3200 pins per tool, and to allow for breakage by new men, we bought 50% over. I showed him the way we braze on new tips like this:



"Tools made like that stick better than the ones recessed with an end mill. Fellow from the KENNAMETAL factory says, one wall to position the tip against is better than a wall all around the tip, because you don't get the warping strains on the tip. Rest peaceful, Harry—we've got enough tools".

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Speed is the keynote of this vast defense production schedule. This Turning Tool increases production by reducing set-up time, by speeding up cutting, by doing right and left hand turning (it requires only ten seconds to change from a right to a left hand turning tool), and by performing several operations simultaneously.

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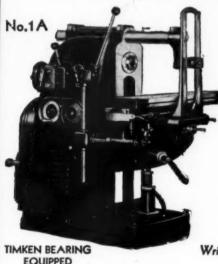
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Featured In This Issue

COMMUNITY SUBCONTRACTING gives many constructive hints and ideas on the pooling of manufacturing facilities in the war effort. It is based on experiences of subcontractors in the vicinity of York. Cooperating closely, they have made sizable contributions in the way of war equipment. See page 81

WIRE RETAINERS and Snap Rings is a continuation of a series of articles by H. F. Williams. Numerous methods of using these handy devices are given, with suggestions that may help solve design problems. See page99

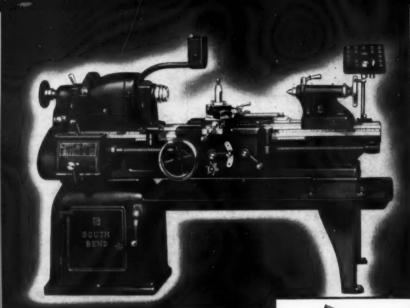
CONSERVATION CONTROL by Merrill Ormes describes an ambitious effort to aid American industry in achieving top production with minmum waste of time, labor and materials. Conceived by Henry Disston & Sons, Inc. Philadelphia, the basic idea is instruction of the workmen in the

choice, use and care of essential tools.

"LET'S TALK SHOP" presents this month, some pertinent information on months and their uses. Also, some useful shop kinks. See page 161

SUBCONTRACT Section, listing new plants with equipment available for war production begins on page208

MECHANICS THRU THE AGES— Blue Book's exclusive picture page 216



VERSATILITY to Speed Production

Versatility which permits quick change-over from one job to another, with little inconvenience or loss of time, is a real speed-up factor in tooling a new job. Such versatility—the reduction of set-up time to a minimum—enables you to get into production quickly. It is one of the advantages in selecting South Bend Lathes for urgent work.



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As The Editor Sees It

THE greatest progress in the furtherance of our present war effort, lies not in the hurried building of more and more plants to increase post-war problems . . . but in stepping-up efficiency of the plant capacity we already have.

The most serious error we have made so far, in the opinion of J. F. Lincoln, President, The Lincoln Electric Co., has been in thinking of production in terms of mere man-hours rather than in just what that man can do in that hour.

When we really begin to increase the efficiency of our present operations, it should be comparatively simple to double our war production with the same number of more effective man-hours.

As a single illustration, Mr. Lincoln calls attention to the fact that in the present building of ships, $\frac{1}{8}$ " and $\frac{5}{32}$ " electrodes are being used for the most part. If electrode sizes were changed to $\frac{3}{16}$ " and $\frac{1}{4}$ ", the speed of welding would be more than doubled. At the same time, the cost of electrodes would be reduced . . . production of electrodes by the same number of man-hours would be increased, and the reliability of the welded joints would be greater.

Similar opportunities for stepping-up production can be found in many of our manufacturing processes.

The problem confronting us is not a mere matter of more welders, more shipyards, more factories and more men. What we must have is top production efficiency from the facilities we already have. Man-hours alone will never beat the axis. Highly efficient man-hours directed by American resourcefulness and production genius can . . . and will do the job.

Wesley G. Paulson



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THROUGH 100 YEARS of peace and war—good times and bad—Ryerson has served industrial America. As in every other crisis, we continue to provide steel to meet the emergency requirements of our nation at war.

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Production Engineering in the War Program

By M. L. HUTCHENS

THE standard machine tool is one of the most vitally important items in the war program. Without these machines it would be impossible to make the great strides toward "all out war effort" that have been made within the past 18 months. When it is considered that the machine tools built during the last 24 months are nearly equal in productive capacity to all of the machine tools in this country prior

to that time, some conception of their importance can be formed.

A small proportion of them are very special single-purpose machines. By far, the greater percentage are standard, the flexibility and adaptability being further enhanced by the addition of standard attachments. The next step is then to use a completely standard machine and adapt it for a specific machining operation by the addition of

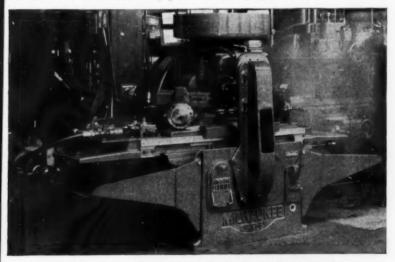


Fig. 1. General view of gear gashing machine showing head and fixtures in place. Note index plate, cover of which has been removed.

special heads, fixtures, or other equip-

It is the purpose of this article to describe in detail an example of adapting a standard milling machine to a mass production problem by the addition of special units. The operation is that of roughing out teeth of straight bevel gears. The equipment was designed and manufactured for one of the largest builders of air-cooled radial airplane motors.

A similar set-up is being used in the machine-tool builder's plant for roughing bevel gears used in standard milling machines. This equipment has cut the roughing time from 20 to 3 minutes for certain types and sizes of gears and a proportionate reduction has been

made on all roughing time.

Essentially, the equipment consists of a standard 1830 Simplex Bed-type Milling Machine with a special vertical spindle head and 2 automatic, hydraulically indexed and clamped fixtures mounted on the table. A 7½ hp motor located in the bed operates the machine and cutter spindle. The hydraulic system for operation of fixtures is

a separate unit driven by an individual 3 hp motor. A good conception of the general appearance of the set-up can be obtained from Fig. 1.

The bed-type machine is exceptionally rigid since it has few sliding surfaces. Adjustments for cutter positioning are, however, easily made. The spindle block slides between 2 uprights and simplifies the adaptation of the standard machine to special requirements. Two solid steel cylindrical overarms add to the rigidity of the entire set-up and simplify the design of special heads or other units since they offer ideal mounting facilities.

The head described was designed for this specific problem and, therefore, is special. It is mounted directly on the 2 overarms and clamped rigidily to them. This design makes it possible to move the entire head along the overarms for positioning relative to the workpieces. Drive for the head is taken from the machine spindle thru a 6 splined shaft to allow for cross adjust-

ment.

The drive then carries power to the left of the head and vertically to the

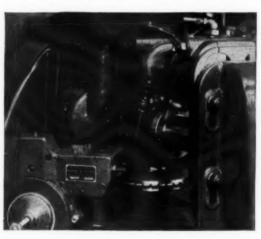
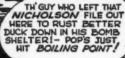


Fig. 2. Close-up of vertical head, viewed from front, showing special cutter in place on spindle. Sulphur base cutting oil is used as coolant.



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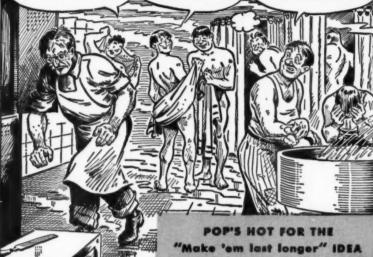
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YEH! - DON'T MOBODY LIGHT A MATCH! - TH' OL MAN'S HIGH EXPLOSIVE ON THE SUBJECT OF NEGLECTED TOOLS! WITHOUT LOOKIN'
AT NO CRYSTAL BALL, I
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ABUSE of files wastes fine tool steel. To get the most out of files the efficient worker observes these rules:

- · Use The right file for the job.
- Don't put too much pressure on filing stroke.
- Don't ever "drag" file back under pressure.
- Don't throw files in drawer or tool box containing other objects.
- Keep files separated—standing with tangs in holes or hung on rack by their handles.

- Keep files in a dry place to prevent teeth-corroding rust.
- Keep files clean of "chips"—brush frequently with file brush or card.

The better the file the greater the reward of care. Nicholson and Black Diamond files are made to serve long under normal circumstances, still longer under proper care and use. Nicholson and your mill-supply house guarantee Twelve perfect files in every dozen.

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NICHOLSON FILES





Fig. 3. General view of machine showing hydraulic pressure lines to fixtures, also scale inlaid in overarm to aid in setting head.

upper end of the spindle as shown in Fig. 2. This is done so that a larger diameter bull-gear can be used. The final drive to the vertical spindle is thru helical spur gears. The spindle is of large diameter and is mounted on opposed tapered roller bearings. A special 12" diameter cutter is used to keep the arc at the root of the teeth as nearly straight as practical.

Due to size of the cutter, the spindle speed must necessarily be slow. To maintain a constant rotation of the spindle and to eliminate chatter a thousand pound flywheel has been mounted at the top end of the vertical head spindle. One cutter is required for each pitch of gear being cut. As shown in Fig. 4, it is made in the form of a ring. This has been done essentially to keep the cost of the cutters to a minimum by reducing the amount of high speed steel required. Another reason for this design is to facilitate cutter changing by increasing the diameter of the locating surface.

The cutter is of the eccentric relief, ground contour type. It is driven by 2 keys 180° apart. Sharpening is done by grinding on the faces of the teeth. This cutter as mounted on the spindle

is shown in Fig. 2, and is held firmly in place between 2 hardened and ground steel plates. Rigidity of the set-up has been further increased by mounting the cutter directly on spindle nose as near to the lower tapered bearing as possible.

It has been found that the large diameter of cutter has a distinct advantage other than the fact that it forms a smaller arc at the root of the teeth. The longer periphery gives the cutter more time to cool between engagement with the gear blanks. This materially increases production by allowing a higher feed rate and also prolongs life of the cutters.

A special outer support shown in Fig. 1 has been included in the design to add to the rigidity of the set-up. Vertical adjustment can be made by loosening 4 studs at the front of the support, unclamping the machine spindle block and moving the entire head and block as a unit. Very little adjustment is required since the cutting position is on the center line of the fixtures regardless of the pitch of the gear being cut.

As stated previously, lateral adjustment is accomplished by moving the

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"Mohican" Atlas Steels, Ltd.

"Bethlehem HM" Bethlehem Steel Company

"Mo-Cut" Braeburn Alloy Steel Corp.

"Star Max" Carpenter Steel Co.

"Molite 8" Columbia Tool Ster

Company
"Rex-T-Mo" Crucible Steel Co. of

America

"Di-Mol" Henry Disston & Sons, Inc.

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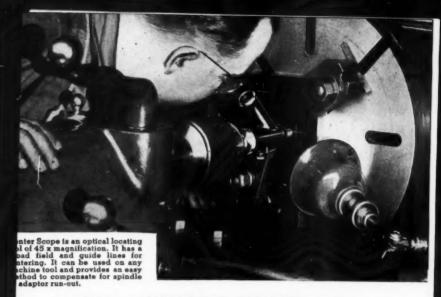
vertical head along the overarms. To facilitate setting the head to the correct position for various sizes of gears, a scale is inlaid in the right hand overarm. This can be seen in Fig. 3.

The fixtures for this operation are particularly interesting in design. They are automatically indexed and clamped by hydraulic pressure. A piston, located in the top of the fixture, actuates a slide bar which in turn causes a system of pawls and plungers to Indexing is obtained from function. master notched plates. One of these plates can be seen in Fig. 1. Gears having from 7 to 53 teeth are cut with this equipment. Indexing is done on the return stroke of the table, after one tooth has been cut and the table approaches the opposite fixture.



Fig. 4. Special eccentric relief, ground form, high speed steel cutter for gashing bevel gears. Grinding is done on face of teeth.

All table movement between fixtures is done at rapid traverse rate of 120" per min. On the forward stroke of the table, as a fixture nears the cutter the work holding spindle is clamped. This is accomplished by a second hydraulic piston actuating a lever which in turn rotates a nut. This action closes a split ring tightly around the spindle. Since this ring completely



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'e'd get nowhere **fast** on the "firing line" if our materials of war weren't etter than those used by the axis! The same is true on the production ne; and that's where Center Scope enters the picture.

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encircles the spindle, distortion is elimnated. The fixtures are mounted on swivel bases so that gears of other than 45° bevel can be milled. Periphery of the base is graduated in degrees to facilitate setting various angles. Hydraulic controls for the fixtures are mounted at the left end of the table as shown in Figures 1 and 3.

The gear blanks are held in special collets, each designed to hold one particular size or group of gears. The collets are closed by tightening a draw-in-rod extending through the spindle. A view of one collet with a gear in place is shown in Fig. 5.

This equipment has paid for the initial investment in a short period of time, due to the greatly increased production obtained. In the future, it is machine is no longer needed for this operation, the special equipment can be removed, leaving a completely standard milling machine available.

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Fig. 5. Close-up of fixture and cutter viewed from rear of machine.

Note gashed gear in collet and swivel base on fixture.

In the present emergency it is of utmost importance that a standard machine tool can, with suitable special equipment be readily transformed into a high production, single purpose mechanism. Never before has full advantage been taken of the flexibility of machine tools. The planes, tanks, guns and ships now rolling off assembly lines ahead of schedule prove what can be done.

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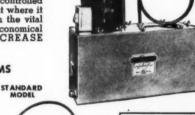


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Produce parts like these



The part illustrated above is a simple gear blank, before and after being sidefaced and reamed with sized hole, ready for the final operation of topping and facing the other side. It is typical of the many different small parts which can be worked on standard engine lathes to help remove the load on other machine tools. This job is being done on a Monarch 16" Model W lathe, with hexagon carriage type turret, clips on cross feed and positive length stop. Only one setup is necessary, the turret carrying all necessary tools.



How this job is done

- 1 Chuck blank
- 2 Face one side
- 3 Drill point
- 4 Rough drill hole
- 5 Bore hole
- 6 Ream to plug size
- 7 Remove blank from chuck

Material—SAE-2350 steel. Tools—cemented carbide. Total time—4 minutes.

on Monarch Lathes

The ready adaptability of Monarch lathes to a wide range of work is proving invaluable in today's production program. Whether for simple parts like this gear blank, or for automatic operation on large work, there is practically no turning job which can't be done on a Monarch. In small plants and large ones, throughout our country and those of our Allies, Monarch lathes are hard at work producing the implements of VICTORY. THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.



COVER THE TURNING FIELD



43 YEARS OF EXPERIENCE IN MAKING BETTER STANDARDS

A FAMILY TRADITION IS YOUR GUARANTEE OF QUALITY



Behind Elmer Ellstrom, the founder of the Dearborn Gage Company, lies 43 years of experience in the manufacture of precision instruments. In 1899 he started as an apprentice under his father, Hjalmer Ellstrom (working with him on the original development of the

gage block) in the great Swedish Arsenal in Eskilstuna.

With this early training in precision measurement gained under the guidance of his father, together with the experience gained in plants both in the United States and Europe, Elmer was convinced that there could be a more satisfactory standard made that would withstand severe production use and at the same time require less care in handling.

With this thought in mind and with the help of his sons, Elmer, Olof and Ralph, he applied his skill to the problem of developing such a gage block through the

process of chromium plating.

After many trying experiments and much discouragement, this process of successful chromium plating gage surfaces was perfected, so that chromium could be applied and finished as accurately as steel. These finished accuracies were then verified by the national Bureau of Standards.

Thus the Ellstrom family made the first major improvement in the manufacture of gage blocks since their original

development in Eskilstuna, Sweden.

This improvement has not only brought to Elmer Ellstrom and the Dearborn Gage Company, world-wide recognition as the manufacturers of the finest gage blocks, but it has also given industry a standard of measure which can be relied upon for many times the life of any other standard. This is doubly important now, when the saving of time is so vital to Victory.



DEARBORN GAGE COMPANY

22033 BEECH STREET

DEARBORN, MICH.

The Human Factors in Morale Building

Part IV-Training Within Industry

By EDMUND MOTTERSHEAD

M.R. EMPLOYER, let's sit down for a little visit. I've been talking about human factors in morale building, how to get results from the people working with you and for you, and you've been getting out the goods to

carry on the war.

You know, even better than I, that this is a war of production. Production is your business . . . and in some cases your headache. People who study the situation say that in this war under our present methods of getting out the goods, it takes somewhere from 9 to 20 men producing food, clothing, munitions, transportation, ships, guns, planes, and all the rest of the needed materials to keep one in the fighting.

In World War I the ratio was 7 to 1. Technological advances, substitute materials, plastics, new discoveries and the like may cut the ratio for this war to 9 to 1 . . . we hope.

But in doing your job of getting the goods to the men in action you have certain problems. A questionaire sent to hundreds of foremen in many plants showed that these problems fall into four classes: 1. Production. 2. Safety. 3. Quality. 4. Personnel.

Let's break these down a little and see what they really are.

Production Problems

One of the commonest complaints these days is that of excess wear and tear on equipment. I was recently in

Thomas E. Wheat, for 11 years a skilled Westing-house machine tool operator, teaches "learners" in the South Philadelphia Works. He is shown explaining milling machine technique to two 18-year old boys who will soon be contributing their efforts to war production





a paper box factory which makes shell cases and fuse boxes for the Army, and they had special equipment which had been running 3 shifts, 24 hours a day, for the last 18 months. Certainly. where parts are practically unobtainable and where breakdowns are costly, IF there is a RIGHT WAY to do the job, the operator should be trained to use it. New types of equipment bring difficulties in getting the men up to production. Many times your foreman has to puzzle out a way to run the machine and then turn around and teach other operators.

Mix-ups in trucking service or other transportation facilities; deliveries that are delayed because of errors in making parts for assembly . . . delays in deliveries because of very simple accidents . . . these bring their own headaches.

Poor planning. That's a sore spot. It is always easy for the fellows farther down the line to pass the buck back to you on this score. But a lot

of the complaints hinge upon the way somebody performs some routine job along the line in putting the plans in action. One of the commonest complaints I have heard refers to incomplete blueprints which are handed down to the man in the shop, giving him orders to go ahead, only to find a few days later that the complete prints have been altered in such a way as to waste much of his work. The care and handling of the prints themselves and a decent filing system for them are simple matters of good planning which the subordinates who see the plans put into action should observe.

Safety Problems

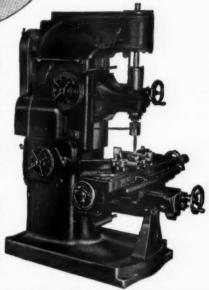
I don't know which of the various safety problems is the greatest . . . probably carelessness or heedlessness. I stopped in the machine shop of a middle-western railroad the other day, and the foreman had told a worker to replace one of the flexible stay-bolts on the boiler of a locomotive. We went over to watch, and found the man



Our All-Out Victory Program demands 24-hour operation at maximum speed. This means sturdy machines that can stand the production pace, like the No. 40 Knight Miller. It is a universal vertical unit that combines the maximum amount of versatility, rigidity, accuracy and speed without sacrificing any one quality for another. It is designed to perform many operations at one setting which ordinarily would require several set-ups and often more than one machine—important considerations when time is so valuable.

The No. 40 Knight Miller offers ease and flexibility of operation for efficient light milling jobs—accurate and speedy boring operations due to dial indicators—Timken mounted spindles—sturdy, rigid table, etc. It is also capable of heavy milling such as taking ½° off the 5° faces of steel forgings with a 2°x6° helical cutter.

WRITE FOR FURTHER DETAILS.



W. B. KNIGHT MACHINERY CO.

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ST. LOUIS, MISSOURI

working on the boiler with 250 pounds. pressure on it, standing directly in front of the head of the bolt as he took it out. If it had been broken it would have torn a hole in him. Anyone should know better, but he just couldn't bother to take reasonable precautions.

The foreman of one of the smaller sub-contracting shops told me a story he thinks would make a good cover drawing for one of our national weekly magazines. It seems that the firm had recently installed a thousand gallon tank and filled it with gasoline. One of the boys was a fair sign painter; so they put him to painting INFLAMMA-BLE on the side of the tank in red. About half an hour later they found him sitting there, paint brush in hand, the cigarette dangling from his lip not 6" from the spout on the tank!

Piling of materials, leaving bars, rollers, tools, miscellaneous junk on the floors, scrap not cleaned up properly... all the factors in good shop house-keeping are aggravated these days by the rush of materials and the pressure of getting the goods produced. And yet, with man-hours so precious, it is more necessary than ever that these

things receive proper attention. Part of every worker's training on the job should cover these points.

Sometimes the men are not informed as to the actual hazards of their jobs. The need for goggles, even for five minutes' grinding or welding is not emphasized. Sometimes a skilled operator will become careless and try to cil or adjust his machine when it is still running. Minor scratches and cuts and blisters are not reported to the first aid center and develop into major injuries.

In 1941, enough man hours were lost due to unnecessary accidents to have built 14,000 big bombers . . . and how we need those bombers today!

Quality Problems

I don't suppose that scrap or rework is the problem in your plant that it is in so many others. All of your men can handle micrometers and gages satisfactorily. They never leave precision instruments or gages where they can collect grease and dust. They always follow specifications to the letter, and when anything is left up to their own judgment it always turns out fine. You

At the horizontal boring mill is 19-year old James Stelzer, an advanced "learner," who will soon be a regular machine tool opercitor.

On the previous page, an expert turnet lathe operator is shown imparting group instruction.

(Both photos courtesy Westinghouse)





AN INSPECTION of pneumatic equipment may reveal many jobs which can be done better at half line pressure or less, affording an opportunity to cut costs, lighten the load on compressor equipment, and improve production. Thousands of Hannifin Pressure Regulating Valves are aiding maximum production by providing correct working pressures on arbor presses, air chucks, riveters, air vises cylinders, and other pneumatic machinery.

Installing a pressure regulator for each individual machine not only means efficient use of air power, but allows quick and easy adjustment for different types of work.

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Hannifin Pressure Regulating Valve means sensitive accurate control, with adjustment over the entire working range to provide any reduced pressure desired. Long valve stem travel gives large volumetric capacity, meeting varying operating needs with minimum restriction to flow.

The wide range of adjustment makes this valve adaptable to many different service requirements. Built in three standard sizes, %, 1½, and 3¼ inch, for use with initial pressures up to 150 lbs.

Furnished complete with pressure gauge. Write for Bulletin 56-H.

In stock for immediate shipment.

HANNIFIN MANUFACTURING COMPANY 621-631 South Kolmar Avenue Chicago, Illinois

HANNIFIN VALVES

Here is an experienced operator coaching a beginner on the intricacies of boring mill operation. (Photo-couriesy National Machine Tool Builders' Ass'n.)



never have any difficulty in meeting inspection standards.

Enough said! The tolerances required in manufacturing airplane engines and guns and fancy sighting instruments, as well as the quality requirements of all war materials have placed extra emphasis on the need for quality as well as mass production. We will not have wood soles and canvas sides on our soldiers' shoes as has Rommel's army in Africa, nor will our tanks break down in desert or winter compaigns, but that quality doesn't "just happen" . . . the men have to be trained to put it into their work.

Personnel Problems

What voice in the wilderness first cried:—"Where can I get skilled operators?" What would YOU give for a dozen skilled machinists right now? How many skilled men have left your plant because they thought they could make more money elsewhere? Have you ever seen the man who claims to have the experience and then doesn't come thru on the job?

One of the commonest complaints of the many foremen with whom I have talked, is that about the worker who is perhaps "allright on certain types of work," but "if you put him on anything else you just have to stand and watch him every minute. He's been around here 15 years and it's always been like that." These foremen didn't realize that the workers who "have to be watched every minute" had never been trained.

Perhaps you have found men who can't get the "hang" of the job, who get discouraged while still learning, or who apparently lack interest in their work. In one company I visited recently. I was stressing the importance of doing everything possible to make the work and the job interesting, and got the reply: "Oh, we can't take that much time to do all that. We just let 'em work around for a month or two and as they find out more about the job, they get themselves interested." So I asked what the turnover was in that department and learned that they were hiring new people every couple of weeks, that an "old hand" had been there for three months. Figure it out for yourself.

The manpower requirements of this war are enormous. We have already seven million workers in war industries and by the end of this year hope to have at least ten million more producing war materials. Some time ago, the

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ke Bendy Janking Punktung Charles

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THE CINCINNATI SHAPER CO. CINCINNATI, OHIO

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Addessa

1941	1942	1943
WORKING FORCE55,000,000	57,000,000	59,000,00
Civil Production	32,000,000	23,000,00
WAR INDUSTRIES 5,000,000	18,000,000	25,000.00
Unemployed 4.000.000	2,000,000	1.000.00
IN UNIFORM 2,000,000	5,000,000	10,000,00

accompanying simple table was published giving us a revealing picture of the labor force available and what must be done.

By the end of 1941 there were about five million workers in war industries. During 1942, it was hoped, thirteen million workers would be added to that list and three million men more would be in uniform. As of March 30, 1942, the picture has changed a little. The Employment Security Review of April, 1942 published the accompanying table. formed by workers indicates that of the remaining 596 occupations, 248 are suitable for women, 188 are partially suitable for women, and 160 unsuitable. Fully 197 of the jobs suitable for women have at present a training period of less than six months. IF, and it's not such a big "if" after all, the men are mustered into the army, these women will have to be trained to take their places.

The war program demands that the total labor force of the nation be di-

INCREASE IN PERSONS ENGAGED IN THE WAR EFFORT, END OF 1941 TO END OF 1942:

Workers from these sources will transfer Net increase in labor force 2.800,000	То	
Reduction of agricultural	Armed forces 2,200,000	
employment	War industry10,500,000	
12,700,000	12,700,000	

In a word, within the next few months nearly thirteen million people will find themselves in work different from that in which they are at present, or have been engaged. And this process will continue thru 1942 and on thru 1943 for yet an additional seven to ten million workers!

And still there are other complications. Brigadier General Lewis B. Hershey, Director of the Selective Service System, summarized the need for proper allocation of manpower between military services and war industries when he said:—"I can't see the advantage of taking a man into the Army if he is needed to make a gun." BUT, that man may not needed when someone can take his place.

The Bureau of Employment Security has prepared an analysis of 623 occupations essential to national defense. Women are now employed in only 27 of these. Analysis of the duties perrected to the accomplishment of war aims. You, Mr. Employer, will see what you thought was your manpower depleted to fill the ranks of the army and see skilled workers shift to other plants. You must replace those workers with women, with young people fresh from farms and schools, with people who are unemployed today and almost unemployable, with cripples and old men, with anyone who has an eye and a hand that can produce.

How we got ourselves into this situation is of little immediate concern. The problem is how to get out of it. The United States must do overnight, as it were, what Germany and Japan have been doing and preparing for for 10 years or more. We have subscribed, even before the philosophy was put into words, to the social and economic doctrine of the more abundant life, renouncing and denouncing war as an instrument of national policy. Our

UP TO THE MINUIE...

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SMALL PRESS BRAKE-

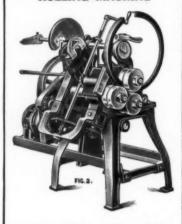
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present enemies have set war and the conduct of war as the prime objective of the state and the highest purpose of the individual.

The 10 years of industrial depression thru which this country has passe brought training of new men for skille jobs practically to a standstill. Retool ing was postponed and postponed again Today this country is faced with the most gigantic expansion program everaced by the industry of any nation. In less than a year, thirteen million people must learn new jobs, learn therefast enough and do them well enough to make an arsenal of democracy, a arsenal of victory.

The answer to this problem can b found in one word: TRAINING.

At least 90% of all training must b done right on the job by foremen, as sistant foremen, leadmen, work-heads and experienced workers. About 389 of the work is skilled. Skill of higher order is required today because of the need for interchangeability of parts. No matter who makes the parts or in what part of the country the are made, when a battery of anti-air craft guns facing the enemy needs nev tubes or barrels, each must fit exactly . . . there is no time to fit and adjus them then and there. The kind o work produced is almost entirely nev in many shops, and older workers a well as new ones must be trained.

Possibly, Mr. Employer, you have already faced these facts and come to the same conclusion. Perhaps you have come already to questions such as:—
"Is it too late to start training now? How long does it take to get results? Where can I get help on good training plans? What about the cost? How do I start?" There are no cut and dried answers to these questions, but there are certain immediate steps you can take, integrating your actions with the activities of various agencies which can help you.

Don't BOLT your nachines to the floor



LEVELED MACHINE ES BETTER WORK ND LASTS LONGER

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From an over-all national standpoint there are 8 essential points in the program: 1. De-skilling the jobs. 2. On-the-job Training. 3. Pre-employment Training. 4. Upgrading Workers. 5. Supplemental Training. 6. Training to Train, or Job Instructor Training. 7. Supervisory Training or Human Relations Training. 8. Apprentice Training.

Let's take a quick look at each of these and then examine the ones you can do something about.

Deskilling the jobs

Deskilling simply means that many of the jobs in your plant that you consider skilled or semi-skilled can be broken down into several jobs of lesser skill and even very little skill. This will reserve the worker of really higher skill for more difficult and important tasks. At the same time, it will make possible the training in a relatively short period of time of the millions of new workers coming into war industries who are without the required skills.

On-the-Job Training

This is where 90% of the training will have to be done. The foreman or supervisor takes the responsibility of training the man directly on the job without any classroom or other outside instruction. Advancing a semifinish grinder to finish grinding, putting absolutely "green" workers on simple assembly or inspection jobs, gradually building a helper into a

skilled operator, are a few of thousand of examples.

Pre-employment Training

This is primarily a function of governmental agencies, channelling youn people, and for that matter many adults, thru necessary vocational training courses in welding, electrical work lathe operations, drill press, shaper milling machine, or other skilled operations so that in a relatively short time they will be able to handle the job to which they are assigned in your plant.

Upgrading Workers

This is, together with deskilling, the core of planning by personnel manage ment to make the greatest possible us of each worker's skill. It is probably the most important factor in the activity of our war inudstries from the standpoint of production and employ Upgrading, of course, has long been something practiced by American industry, very likely without giving i a specific name. Specifically, it mean the natural and logical upward movement of employees within an organization, developing and using each to his greatest ability. Four things are essential:

A. Definite lines of job progression

Both within and between departments there should be planned promotion from within the organization Workers should, where necessary, be transferred to other lines of work for which they are better fitted. Many employees who are qualified should

FLEXIBLE ABRASIVE WHEELS

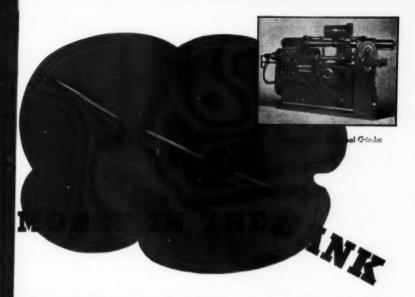


Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular lobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

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THE TOPEKA FOUNDRY AND IRON WORKS CO.

306-22 Jackson St., Topeka, Kansas

switch jobs to increase the general versatility of the manpower within the organization . . . job rotation. cently visited a concern and observed a crying need for just that. The interdepartmental competition between the foremen was so great that as civilian production departments were cut down in the shift to war productions many skilled workers were let out instead of shifted, which meant that the expanding war production end of the business had to employ outsiders and put in a greater training effort than was necessary. Workers within the organization left because they saw the better jobs filled from the outside instead of by upgrading from the ranks.

B. Job Instruction

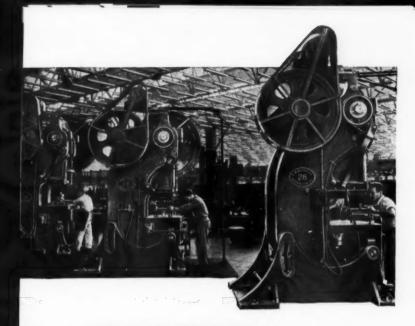
There is a great deal of difference between definitely "instructing" the worker on his new job and "letting him learn" when promoted or transferred. The system of having a "helper" work with a skilled operator and gradually "pick up the knack" of a job may be good enough for peace time production, but the 80% of the helper's time spent as general flunky for the operator who makes no effort to train him is a waste we cannot afford these days.

C. Rate adjustments

With upgrading and promotions, there should be immediate adjustment in individual rates, set up according to performance and shift to other jobs . . . these rates being reviewed by management periodically to keep them equitable.

D. Supplementary Instruction

Employees should be encouraged to seek outside instruction where obtainable by means of preparing themselves for increased usefulness and increased earnings. Such supplementary outside instruction should be examined by your



Peak PRECISION Production

the war effort, and government constantly setting up new production goals, the need for precision equipment becomes more and more acute.

Five American plants with a background of 85 years machinery building experience enable Bliss to play a prominent part in supplying Uncle Sam with

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company to determine its usefulness to your own circumstances.

Supplementary Training

Supplementary training differs from pre-employment training only in that the learner is already employed and will remain employed by his same company. A particularly clear cut case of this occurred recently in a small sheet metal plant employing normally about 60 men. Under war contracts. this firm was setting up a machine department with about a dozen turret lathes to turn out bomb shells. Skilled lathe operators were unobtainable. In addition, between 30 and 40 middleaged sheet metal workers faced a prospect of either becoming lathe operators overnight or looking for new jobs . . . and at their age in their craft, jobs are getting more and more scarce. the cooperation of the U.S. Employment Service Office and the local state Normal School, a special intensive

course was set up to train these me in three week ends giving them su ficient basic knowledge of lathe wo to tackle their new jobs. This w followed with sufficient on-the-job in struction to salvage most of them useful workers in the war effort.

Another company has been practicing since 1939 a method of developing or erators of precision machine tools the call learner training. Employees se lected for this training leave their reular jobs, are paid for the time spe in training, and are trained in cla rooms and on machines by instructor within the company.

The City of Holyoke, Mass., and th National Blank Book Co., entered in an agreement which enables the cit to use the company's machine sho for pre-employment training in th operation of machine tools, conducting the training under the direction of th public school staff. Other arrangement



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have been made where companies have arranged to use idle machinery in vocational schools and other institutions, or vice versa, and to train men with their own instructors. Either situation makes use of idle tools and equipment for both pre-employment and supplementary training.

Training to Train:-Job Instructor

The problem inherent in the situation is simply this:—While the great bulk

of job instruction must be done by foremen, lead men, skilled workers and supervisors, these men are not necessarily skilled instructors.

The typical formen or lead man or assistant foreman moved up thru the ranks to his present position due to his own skill in performing a job or jobs, seniority, "pull", opportunity, and or a thousand different reasons. This combined with the habitual attitude of letting the new worker learn for himself, rather than definitely instructing him, has brought us to the point where a few of the foremen are good trainers. many are indifferent or poor, and far too many are found to ignore almost completely not only the right WAY to train a man, but the very necessity for their training him.

To meet this need, a number of forward-looking firms in New Jersey got together, boiled down their training experiences of the past 25 years and developed a streamlined method of job instruction which contains the essentials of how to teach anybody any-

thing.

This was tested in their own plants, the "bugs" knocked out, and the result turned over to the then OPM, now War Production Board, Training Within Industry Division. The essentials of this plan are outlined in detail: Supervisory Training, or Human

Relations Training

The solutions to the problems of production, of safety, of quality and per-



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- Dress the face of the grinding wheel so it has exactly the same curve as the tool to be ground.
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- 3. Grind clear to the cutting edge.

THIS IS ALL DONE IN ONE OPERATION

Because the tool has been ground with the circular relief exactly the same as the curve of the tool, the outside of the tool is left convex. Therefore, all the metal possible has been left behind the cutting edge to give it maximum support, and the tool longer life.

The degree of clearance is determined by the distance the tool is moved in or out against the curved face of the grinding wheel.



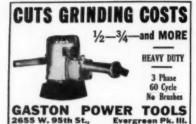
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sonnel lie fundamentally with the supervisor. They depend upon his knowledge of the job and company policies, his vision and ability as a trainer, and his gualities of leadership.

As a part of such training, 4 generally present needs should be met:—

A. A clearer definition and understanding of company policies. Labor, industrial relations, customer, maintenance, quality standards and other policies should be considered.

B. A clearer understanding of responsibility and procedure, the handling of inter-departmental relationships, etc.

C. Improved knowledge of the company, its products, its techniques.

D. Improved handling of the workers, better handling of the men, building loyalty and cooperation, etc. Apprentice Training

We are in our present predicament to a certain extent because we did not provide thru adequate and planned training, the skilled workers we need





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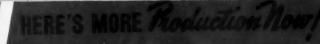
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J. R. Reich Manufacturing Co. 45 E. Stroop Rd., Dayton, Ohio

today. That must not happen again As a part of any training program undertaken by your firm today, there should be a long term program of apprentice training to develop all-round skilled craftsmen. This is accomplished by having each apprentice pursue a predetermined and scheduled program of progressive work assignments and supplementary instruction.

Trade apprenticeship should be regarded not only as a long term program from which industry must eventually obtain most of its skilled craftsmen, but also as a source from which may be drawn set-up men, lead men as well as some supervisory and technical personnel of the future. This is not something that will limit the number of available workers, or hold back the capable learner, but it is a means of helping you to select younger men of apparent ability and build systematically for the future.

Those are the 8 points to the overall training program. You can begin deskilling your jobs and upgrading your present working force today. Preemployment training will serve you better if you will make known your needs to the agencies within your vicinity. Supplementary training will develop with your upgrading program. But the day-to-day "on the job" training must go on continuously. Your most pressing need is to have your foremen, assistant foremen, supervisors, lead men, and skilled workers trained as Job Instructors trained to train.



Industry's battle for more production now to being was today largely because it as son 54 years ago! The super-quality standards maintained by EDACTHORS memors than half a century, are now helping tudestry to answer successfully, transcribed demands on a 180-hour week bats (2005 x a 40-hour week EVENT week! heccass KEMPSMITH Milling Machines are segmented and Built to believe that not of conceptory service. Studies, capable of hearies cuts without deflection or vibration. 13 speeds and leads . EDACTED TIME can be depended upon for more PRODUCTION NOW!



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MANUAL TO the tamous KEMPSMITH MAXIMILLER . . . economical in first cost: an afficient, precision miller for tool-room and light production work.



built to speed up production on 3-shift schedules . . . a rugged high-speed miller, with reliable accuracy and extra power for heavy. continuous cuts on long production runs.

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INSIDE MEASUREMENTS: APPROXIMATELY 4'x11'. An outstanding unit needed wherever magne chucks are used. Operates on 220 voltage. A ordinary sized pieces, such as cutters, gea washers, etc., can be demagnetized by a sing pass through its powerful field. Can be eas connected by your own electrician in any convient location in your plant. Equipped wi convenient switch. (If your power is other the 220 volt, 60 cycle, A. C., kindly let us known carried in stock for immediate delivery. 10 DAY FREE TRIAL IF DESIRED.

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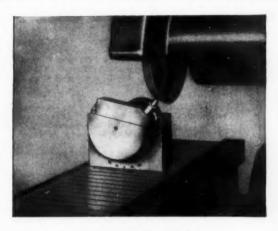
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s suggested by its name, the Welch Quick le Dresser can be set quickly for dressing the hding wheel to any desired angle. It is small, spact, durable; simple in design and construct. All surfaces are hardened and groundnished in plain or Vernier type. Plain dresser duated in degrees... Vernier reads in degrees minutes. The Vernier being an integral part he base block eliminates any possibility of or. 10 DAYS FREE TRIAL IF DESIRED.

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If you are a machine designed take a minute and read this . . .



You are up to your ears on a war job. You reach a poin where you need data about some product you want to us in your design. You haven't got the data at hand. Preciou days may be lost before you get them. Obviously, it's wis to send for data you may have occasion to use before yo actually need it.

Take data about flexible shafts for example. You mawant them at any time because flexible shafts serve two me chanical needs with which you frequently have to deal (1) power transmission; (2) remote control.

And when you have a power drive or remote controproblem, a flexible shaft is the simplest answer you can fine—a single, easily applied unit which will carry power of control between any two points regardless of their relative positions or intervening obstructions.

So why not write today for the following bulletins whic contain information and engineering data about S. S. Whit Flexible Shafts and their application.

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Flexible Shafts for Power Drives,

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Flexible Shafts for Remote Control.



Because of the extensive use of S. S. White Flexible Shaft in planes, tanks, ordnance, naval, signal corps and other war materials, as well as in portable tools and other production equipment, priorities are required on all orders.

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The S. S. White Dental Mfg. Co. INDUSTRIAL DIVISION

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FLEXIBLE SHAFTS for POWER DRIVES, REMOTE CONTROL and COUPLING

Community Sub-Contracting

N SPITE of the extreme urgency of immediate peak war production, many of the nation's war industries are operating far short of capacity, according to Donald Nelson.

Among the reasons enumerated were:

-reluctance to increase the number of
shifts; lack of imagination in meeting
production problems; the issue of extra pay for Sundays and holidays;
faulty flow of materials; time required
to train new men, and shortages of
pertain specialized facilities.

These problems, he said could be vercome by government, labor, and nanagement working together. If the 68 hour work week were adopted, the man-hours devoted to nilitary production would be doubled.

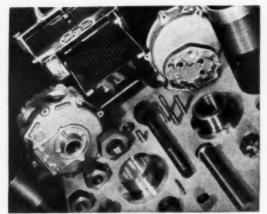
Vast increases in the amount of subcontracting are another vital need, so hat practically all of the nation's small plants will be contributing at least some war production wark. Plants in more cities and towns must turn themselves into Arsenals of Democracy like York, Pa,

Matching York will not be easy. That community of 95,000 entered the battle of production well equipped for the job. It had metal working plants with a wide variety of equipment, normally making everything from 300-ton bank vault doors to food mixers for bakeries. Important factors in the shifting of York's plants to war work were leadership, ingenuity and organization—and no town has a monopoly on these American traits.

Among the first firms in the country to convert its men and machines to the production of war materials was the York Safe & Lock Co. The story of conversion to war work is the story of men who used the brains, hands and machines they had and found a way to help their country and themselves. Much of the credit for the plant's im-

He's not drawing a bead on an enomy ship, but he's hitting at the Axis just the same. This former WPA timekeeper is now producing small parts for America's war machine for a small Eastern floorwaxer plant doing sub-contract work.





Here are typical examples of conversion to war pro-duction work thru sub-con-In the background tracting. is a cube steak machine, the normal product of an Eastern plant. In the foreground are 24 items typical of what this plant has been able to turn out for the war effort after certain retooling and conversion work was done. Included among the 24 items are aluminum crankcases, steel 'spouts' for anti-tank guns, bronze flanges, nets, and various screw machine parts. Conversion was necessarily simple, since the company is still filling army and navy orders for the cube steak machine.

portant contributions to the national war effort and to its own prosperity and that of York's citizens must go, ironically, to the depression of the early 30's.

They were builders of vaults for some of the largest banks in the country, but found business terrible during and after the depression. So many banks had closed their doors that there were hundreds of second-hand bank-vaults (which are built to last) on the market. Practically no one could be persuaded to order a new one. Then, after staggering thru the depression, this company looked up and saw war clouds.

Realizing that America was unprepared, the management took stock of its plant to see what could be used to help make the U. S. and its fellow democracies stronger—the company had plenty.

First of all, it had machinery which could and did, for example, construct a 300-ton bank vault door and hang it so precisely on a 30-ton hinge that it could be opened and closed by hand It also had machinery to make and assemble intricate pieces of the combina-

tion lock for that door. Further, of course, it had highly skilled workers to man the machines—workers trained to handle precision work on custombuilt jobs.

Not a small asset was the experience the management and many of the workers had obtained when the plant had filled war orders—mostly firing mechanisms—in World War I.

But one of the biggest assets the Company had was its neighbors—the large and small machine shops in the community. Most of these were manned by precision artisans who normally turned out a diversified assortment of products. And one of its assets, don't forget, was the necessity of finding work for its machines and men.

The management took a list of its assets to Washington and matched them against the War Department's needs It returned with the first ordnance contract let to private industry since the previous war—a seven-figure job.

The problem of filling the order was attacked by "breaking down" the job into 6000 parts. Many of the parts, it was found, could be made by concerns in the vicinity who normally specialized in similar parts. Others could be

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Reasonably good deliveries on all popular sizes; moderately priced.

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ACME TOOL COMPANY

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NEW YORK

made by firms which had ingenious management, skilled workers and versatile machines.

Altogether, 45% of the work on that first job was subcontracted to nearby plants. But—and this is a policy from which they have never deviated—they kept the most difficult parts in their own plant.

Because of the versatility of the machines and the clever manner in which the machines were used, the management found it could use practically every machine in the plant, and had to add comparatively little new equipment. Gauges, gears and some special purpose machinery had to be added, but much of the new machinery, expanded rather than changed the plant.

After efficiently fulfilling that first contract, the firm won other contracts. Personnel doubled then quadrupled within a few months, and has since doubled and doubled again. A large assembly plant has been added, and a huge new ordnance plant will be in production soon. Because there is still demand for safes and locks and fire-proof doors, the company has not com-

pletely abandoned production of them altho they amount to less than fivper cent of the total.

They learned, however, that thei normal products can't be produced efficiently on machines used in war production. There is, the management explains, too much crossing and recrossing of materials and men. So an olbuilding was bought some distance from the plant, and there production of the company's normal line is concentrated.

In its dealings with subcontractors the management has learned man things, but nothing more important han recognition that the subcontractor must be able to make money on work or at least be protected against loss.

Therefore, they did not insist on fixe prices from many of the subcontractors. They knew the other firms, their capabilities and limitations; they coul guess pretty shrewdly whether a firm was capable of handling a certain jo at a reasonable cost.

The system of "pilot jobs" wa adopted—giving a plant some work t do, helping it get started right, an

Cutting of spouts for anti-tank guns, such as shown in the fore-ground, is the present work of this lathe, converted from production of cube steak machinery. Conversion to war production and stepping up the temporequired only a few hours.



WISPENSABLE for WAR RODUCTION

No. 55-Table speeds up to 125 ft. per min.

Working Surface - 12"x36".

se Grand Rapids Grinders, and others, will enable you neet the demands of the present Defense program.

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Style "A" — Table speeds up to 150 ft. per min.

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GRAND RAPIDS, MICH.



The owner of this particular Eastern floor-waxer plant (left) has planned and almost completed conversion of his equipment to war production. This 5 spindle drill press has been equipped with special chuck and drill for production of anti-aircraft qun parts.

finding out from that job whether it could be counted on for further orders. As the subcontractor did more and more work, it became possible to fix in advance a price for a job.

One of the difficulties was lack of experience on the part of many of the subcontractors with the rigid inspections of Army and Navy engineers, who insist that parts must meet specifications closely.

Because it is human to err, many of the subcontractors occasionally spoil valuable material and waste time by not turning out work exact enough, or by making outright mistakes. If the mistakes are rare and if the shop is essentially a good one, the management has found it is best not to penalize it too heavily. Much waste can be avoided by close inspection of the subcontractor's methods and by showing him how to proceed.

Altogether, the Company has turned out or is working 18 different items for the Army and Navy, and machines and men of virtually every shop in the community have had a share in the work.

Since the company won its first contract in 1938, many other plants in this diversified community have swung into war production on their own, all making full use of the facilities of their neighbors. "Do what you can with what you have," became the cry of the York manufacturers' association. The directors of York Ice Machinery Corp.: stirred by the potentialities of the machines in the community, called in representatives of several other firms to go over blue prints of heavy guns and parts and it was found that among them they could swing the job. York Ice Machinery took the responsibility for a good-sized contract, which has been subcontracted widely, each plant doing what it could with what it had.

In addition to expanding its normal production of refrigeration units and compressors to meet the demands of the Navy, York Ice Machinery is doing subcontracting work for some 25 firms, including York Safe & Lock.

The Read Machinery Co., which had been making food mixers of all sizes and shapes for a long time, began making food mixers for army camps instead of for bakeries. Then it found that a powder mixer is very like a dough mixer turned upside down, and it has gone to work on them. Still not satisfied it was doing all it could, it contracted to construct a number of field pieces, subcontracting to nearby shops, including York Ice Machinery, all the operations it could not readily perform with its own facilities.

Finally, a highly desirable situation has been achieved in the community where, in one way or another, almost every plant is working for every plant. For example, the A. B. Farquhar Co.; which has not neglected its farm ma-

Companions in PERFORMANCE!

Yes sir, ANOTHER Names "Double Duty" Tool-

THE NEW "RS" COLLAPSING TAP

Remember — Namco "DR" and "DS" Circular Chaser Dies use interchangeable chasers and are also quickly adapted to hollow milling by substitution of cutters and holding blocks.

By similar economical planning—One Basic Design in the new "RS" Tap serves both revolving and stationary spindle machines. Quick and positive opening action, fine diametric adjustment and ground thread chasers offer the same precision and trouble-free production you are now getting from Namco Dies. Ask for proof of this outstanding performance.

"RS" Callegating Tap—Five vises—1-1/4 to 2-13/16" with blade chasers. Larger sizes up to 5" with circular chasers. Shown equipped for stationary spindle.

> "DS" Circular Chaser Die for stationary spindles. Sizes 3/8 to 4-7/8'. Reddily adaptable to Hollow Milling work.



"DR" Circular Cutter Hollow Milling head for revolving spindles. Sizes 5/16 to 4-7/8". May be quickly changed for threading.

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ACME GRIDLEY 4-5 AND 8 SPINGLE BAR AND CHUCKING AUTOMATICS - SINGLE SPINGLE AUTOMATICS : AUTOMATIC THREADING DIES AND TAPS - SCREW MACHINE PRODUCTS - THE CHRONOLOG - LIMIT SWITCHES - SOLENDIOS - POSITIVE CENTRIFUGE - CONTRACT MANUFACTURING. chinery but also has war contracts, subcontracts work to York Ice Machinery, which in turn has a contract of its own and does work for York Safe & Lock.

But with all their conversion, the manufacturers have not neglected production of normal items, which are also necessary for war. Three chain manufacturers continued to make chains—but for the Army and Navy instead of for civilian use. Similarly, roofing companies, a false teeth manufacturer, and shoe, shirt and hosiery manufacturers continued to make their regular products, because the Army needed them.

One way or another, the manufacturers of York have put virtually every suitable man and machine to work on wartime needs.

Another outstanding example of conversion of a peacetime factory into a war plant is the workshop of a thermometer company in the Midwest. Workmen skilled in the manufacture of thermometers and more particularly thermostats and oven indicators find the shiftover to shell boosters a simple one.

Manager of the thermometer division of the company, commenting on the case with which the firm's workers can change from peacetime thermostats to shell boosters, said the two mechanisms are not radically different and tha minor problems involved are capable of easy solution because workers are skilled in precision operations.

The concern also will soon turn the skill of its workmen to the manufacture of gunsights for Air Corps 30 and 50 caliber machine guns. Here, the conversion will be simplified by the fact the problem of making sights involves precise stamping and assembling

To take care of the orders, the company is adding 17,000 square feet of floor space and doubling the present force of employees.

The precision phases of the work will be supervised by the firm's present staff. The plant manager of the thermostat division says the expansion will not result in waste at the end of the war. "We have faith enough in the future to believe that we can turn our increased facilities back to profitable peacetime work," he says.

He stresses the fact that, in addition

Worker in cube steak machinery plant is shown checking measurement of tool hole in turnet with dimensions of a specially built tap which will do the threading on a second-hand turnet lathe bought for this particular sub-contract job.



TOOLS DO DOUBLE DUTY"

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... PERMITS HIGHER

When a change in cutting oil increases tool life as much as 200% it's news worth shouting . . . and worth hearing today!

One of America's great automotive plants changed io SUNICUT α few months ago on all machine tool jobs requiring a straight cutting oil, after rigid teets showed these amazing results:

- · YOOL LIFE INCREASED 40% TO 200%
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Clear, transparent, sulphurized SUNICUT can help your plant, too, meet the higher wartime P.Q* (Production Quota) all essential industries must set today. Let a test run prove it! Call in a Sun Oil Engineer — one of those famous "Doctors of Industry" for specific recommendations. Write SUN OIL COM-PANY, Philadelphia, Pa.

*Production Quota





Back to help America's war effort is 78 year old Phineas D. Allen, who worked on steering riggings for submarines during World War I. Today he operates this drill press on parts needed for new machine tools in war production.

to aiding the war effort, conversion has kept the plant operating in the face of threatened material shortages, and has kept the organization together.

Another profitable example of conversion to war work is a small Eastern firm that was turning out aluminum frying pans, egg poachers, radio dials and control devices. Two years ago the two young owners of this firm were well satisfied with the progress made by their company, formed in 1937. But then came the collapse of the French and the beginning of a defense program.

Today it has converted its machines 100 per cent to production of percussion caps, struts, flap hinges and other bits and pieces for aircraft and has doubled its production.

It was clear that America would need tens of thousands of aircraft. Would there be enough aluminum for radio devices and aircraft? That was the question they asked themselves one hot afternoon in their crowded office as they reviewed their orders. Would they get enough material to keep their score or so of workers employed?

As one said the other day, "We had two ideas that we talked over. One was that there wouldn't be enough aluminum for firms like ours and the other was that we ought to help our country."

They knew they could not make complete planes or tanks in their small plant, but they had not been making complete radios, either. They had been producing parts on a subcontract basis. Why not go after defense work in the same manner? Checking lists of plane manufacturers in the East, they started out at once to see what business they could get. It wasn't easy. Subcontracts were not to be had for the ask-



producing Tough ALLOY STEEL DIES within maintained limits of ±.001" or closer, makes possible a saving of hours of hand finishing. This job and nany others like it being turned out by a midwest die and mold manufacturer a typical example of what can be accomplished with the combination of a corton Super-Speed Mill and a Gorton Circular Table, accurate within .005".

Photo above shows how the die is simply mounted on the circular table.

arge micrometer dials on the Gorton Miller and the sensitive "feel" of the
nachine permit the operator to hold close tolerances with hand feed. Utilizing
the Gorton wide range of spindle speeds, these dies are completely machined
a 30 hours. Precision milling in this manner produces a finish so smooth that
and finishing is reduced to a minimum.

Gorton Engineers, specializing in Vertical High-Speed Milling, will be glad o make recommendations on your work—without obligation.

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HOW TO REPRODUCE ORIGINAL DIES without Skilled Help.

GOTE—To owners of Corton Super-Speed Vertical Milling Machines built since 1945—
you have MULTIPLE DIES 10 REPRODUCE from an original, worder a CORTON
uplicating Tracer Head and Duplicating Table to quickly convert your Miller into a
ouble-purpose machine, capable of Duplicating parts and sinking dies, as well as Milling.
This equipment will effect an average time-saving of 50 per cent with an usakilled mom
remome operator.

SUPER-SPEED MILLING DATA

MACHINE-Gorton Super-Speed Vertical Mill.

PARI-Alloy Steel Die.

Cutters.—Gorton Single and Double Flute Cutters.

DIMERSIONS-134" Deep to Parting Line.

HOLDING—Simple "T" Slot Clamps.

FEED-Hand.

SPEED-950 RPM.

ACCURACY—Limits held ±.00L

on Mill to very smooth finish.

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1317 RACINE STREET, RACINE, WISCONSIN, U.S.A.
SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

ing. But by Fall it was clear that their idea was a good one.

At first the concern bid only on jobs it could handle with its existing machine tools. Later, it expanded a little, adding such equipment as pipe and tube-bending machinery and adding many new employees. New employees have been selected from training schools because of their manual dexterity and have been given intensive training on their own machines.

tors. During negotiations an OPM engineer familiar with the concern's facilities advised both prime contractor and subcontractor on problems facing them.

The concern offers this advice:—"At first bid only on products that you can make with machines you have in your shop and can surely handle. And always remember—a letter will bring you blueprints and invitations to bid, but you will never get a contract un-

This particular milling machine was used to aut steel disk covers for cube steak machines. Now it has been retooled for autting large hexagonal nuts for a government arsenal. "Hexing" a nut is a simple job with a machine designed to shape the nut in a single operation, but such a machine is not available and time is short. Therefore the operator shifts the round steel stock three times, cutting two sides at a time.



Always anxious to increase their production, the partners visited OPM regional office in May, 1941, soon after it was established in their city. While most of this firm's work was obtained thru its own resourcefulness, several contracts were obtained with the field office's assistance. Among these was an experimental order for soundproof aluminum enclosures for auxiliary mo-

92

less you go to the plant and keep after the prime contractor. When you go, take your engineer along, too, so they know you have the goods."

One of the most vital problems of the war, that of shifting from civilian products to rearmament production without creating unemployment, has been solved on a large scale by a beverage container plant.

WINNING THIS WAR IS EVERYBODY'S JOB



Phousands of new workers are pouring into factory doors to help produce the billions of dollars' worth of material vitally and immediately needed to win this war . . . sufficient long-experienced operators are just not available . . . it's a time when a modern type of standard machine tool like the Ex-Cell-O Precision Boring Machine meet the emergency by doing a dual job: its easy control and automatic rating features make it possible to train ordinary operators in an exionally brief time to bore, turn, face, groove metal parts to the highest mercial standards of precision in size and finish, with a minimum of rator fatigue; this ease of operation, combined with basically sound entering design and substantial, rigid construction for which all Ex-Cell-O thine tools are noted, assures the extreme in production, every hour, every day.

Below: Standard Double-End Ex-Cell-O Precision Boring Machine—used for many multiple and progressive operations, on the same part or various parts, to speed up war production.



-CELL-O CORPORATION

DETROIT, MICHIGAN



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Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DRILL JIG BUSHINGS, PARTS



Only a couple of hours'
work was necessary to convert this block adapter from
production of cube steak machinery to spout cutting for
war sub-contracts.

A short time ago the production of stainless steel beverage containers was going forward in the plant. Today hundreds of oxygen cylinders that make possible the operation of giant bombers and fighter craft in the stratosphere are rolling off the line, with practically no lost time of men or machines while converting production.

The immediate need for a safe oxygen cylinder that would not explode when punctured and could yet be built of light-weight material and carry the life-giving air for fighter crews became a vital problem. The factory engineers found a way to do the job. The new cylinder is not only shatterproof but it also resists tearing when punctured by a tumbling 50-caliber machine gun bullet.

Once the cylinder had been developed and proved acceptable, the task of setting up a production line was undertaken. Transfer of the line for the manufacture of stainless steel beverage containers over to this war product was immediately started. The huge 750-ton toggle presses were rearranged to stamp out the spherical domes of the

cylinders and the elaborate automatic welding equipment was quickly adapted to the intricate welding operations required.

Baths were designed containing chemical solutions that acted as passivating and purifying agents and ingenious physical and pressure tests were devised to make sure of the product.

On the same day that the last beverage container for civilian use rolled off the production line, more than 300 skilled steel workers began manufacture of this important oxygen cylinder. No time was lost by the men and no time was required to design, build and install expensive machinery for the changeover.

If these other plants have converted to war production so easily, why not look around yourself to see what you can do! Then contact the prime contractors and "hound" them until you get your sub-contract order.

(EDITORIAL NOTE — Community groups of manufacturing plants in Elgin, Illinois, Toledo, Ohio and many other cities have pooled their facilities for the handling of war sub-contracts.)



The GEAR SHAPER is a cost-saving machine for both long and short runs. It can be changed over from one job to another in the minimum of time. In many cases only a change in cutters is necessary to handle different work. Coupled with all of these advantages, is that of accuracy of duplication. You will obtain a better grasp of its possibilities from our 64-page book "The Practical Art of Generating." Copies are free upon request.



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Precise, Low, Compact Quick-Acting, Durable

Sundstrand Standard Index Bases increase accurate production on milling and other operations by saving time and reducing work-handling. Highly accurate and durable, with quick-acting single-lever clamping; Sundstrand Bases speed successive operations on work held in a single fixture; speed duplicate operations by using two or more fixtures so that work-pieces can be changed at one station while machining progresses at another.

Illustrations show the low, compact design. Other superiorities include easy rotation, rigid clamping, hardened inserts to hold accurate alignment. Sundstrand Standard Index Bases for hand operation are listed in six sizes, can be used on any make of machines. Write, today, for Index Base Bulletin 1-B; and name of nearest dealer.



Sundstrand Manual Index Base, with extra detachable chip guards. Also made with operating lever on right hand side for use in opposed pairs. Illustrated Bulletin 1-8 gives complete description.

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Sundstrand Open Line Tools fill basic needs in shops of all sizes, offer unusual opportunities for profitable sales and improving service. Included are Index Bases, Balancing Tools, Bench Centers, Airport Service Equipment, all fine tools, excellent values. Investigate.

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RIGIDMILS • STUB LATHES

Drilling and Centering Machines • Hydraulic Operating Equipment

NEW! SMALLEST IMPACT TYPE WRENCH



FAST APPLICATION, REMOVAL OF NUTS UP TO 1/4" BOLT SIZE

Angle and Straight Models

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Wire Retainers and Snap Rings

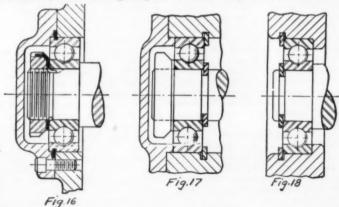
(In Three Parts-Part II)

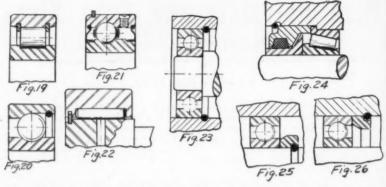
By H. F. WILLIAMS

IN THE first installment of this article which appeared in the January issue of The BLUE BOOK, groove shapes for round, square and rectangular wire were discussed, accompanied by examples and illustrations of round wire applications. This installment part of a three part article will deal with the application of rectangular wire to the mounting of ball and roller bearings. some round wire installations for ball bearings and several other miscellaneous examples. The third part of this article, to appear in a future issue, will deal with assembling methods, European design and applications of specialized types of retainers and some popular American installations.

The mounting of anti-friction bearings, ball, roller and needle types, is simplified by the use of snap rings. In such instances, the retaining ring is nothing more than an "inserted shoulder" in a one-diameter thru-bored hole. It is used to hold either the outer or the inner ring of the bearing in place, or can be used in combination to hold both. It should be understood however, that when end thrust is severe, other methods than the use of snap rings are recommended and are in fact necessary.

In Fig. 16 is shown the mounting of a ball bearing which has a snap ring in a groove at one end of the outer race, as manufactured by most of the ball bearing makers. The groove is slightly wider in the race than the thickness of the ring and as the bearing is assembled, assumes a position with the left side of the ring and groove contacting. The retaining cap is bored to size of the outer race and centers thereon, being counterbored sufficiently





deep and large to clear the ring. Here the cap must be bored to an exact depth so there will be no slack or float axially when assembled. The inner race of the bearing is held against the shaft shoulder with a conventional bearing lock nut and locking washer. The bearing dust cap is secured to the casting with hollow head cap screws.

When a standard plain ball bearing that is without snap ring assembled integrally, is to be used, the method in Fig. 17 can be utilized. Here a thruhole is bored in the casting to accommodate the bearing. A square shaped groove is machined in the bored hole somewhat wider than the ring thickness, the right hand face of the groove being held to the required dimension. A groove of the same size is turned into the shaft against which the inner race contacts. A nut and locking washer retains the bearing on the shaft. When the bearing is assembled, there should be a minimum of 0.010" clearance between face of the cap and the main casting, thus assuring that the bearing is tight axially. In this assembly the cost is reduced, not only by having a one-diameter hole, but because the shaft need not be turned down and shoulder-ground, thereby also saving on stock cost.

When space is at a premium or when

the unit is to be kept as short as possible, the method shown in Fig. 18 has merit. In this instance the hole in the casting is bored with a shoulder against which the ball bearing thrusts. Both the outer ends of the hole and shaft are grooved for retaining rings as in Fig. 17. As shown, the assembly is used inside a case where oil reaches the bearing from either side. Should such a set-up be used at the outer wall of a mechanism, a cover would have to be provided. To further enhance the minimum space required by such a bearing assembly, a sheet steel cover with a gasket is used. The cover is held on with flat head machine screws flush with the cover.

If it is desired to have a one-diameter bored hole and a shoulderless shaft as in Fig. 17, but still retain the features illustrated in Fig. 18, then two sets of bearing retaining rings are used, one set in either side of the ball bearing. The latter, however, is not recommended where accuracy of axial position of the shaft is required.

On e manufacturer of cylindrical roller bearings retains the roller cage integrally with the inner and outer races by means of two flat wire snap rings as shown in Fig. 19. The rollers are assembled in the groove around the inner race after which the roller sep-

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arator is put into place. The outer ring is then assembled and the two rings snapped into place.

In Fig. 20, a snap ring of round wire accomplishes much the same purpose. In this instance, the outer ring, being of the counter-bored type is ordinarily free to be disassembled. However a retainer ring is snapped into the groove in the outer race, thereby preventing the bearing from coming apart.

Most of the ball and roller bearing manufacturers have sealed-in types of bearings which are packed with grease at the factory. This is accomplished by inserting by various methods, a shield on either side of the bearing. In Fig. 21 the manufacturer not only has a grease renewing arrangement but incorporates several other features. The side shields are formed to such a shape as to permit them to be retained by a flat wire snap ring on either side. By flaring the sides of the grease retainers a plentiful supply of lubricant can be inserted. This is done by removing the small headed screw shown at the top of the illustration. The inner race of the bearing has small grooves at the inner portion of the flanges arranged to exclude dirt. It will be noticed also that the bearing has an integrally assembled shoulder ring in the outer race and is placed in position in the receiving mechanism as explained in Fig. 20. This bearing is of the wide type.

In Fig. 22 the cam roller is composed of a shaft or inner race, an outer race and a complement of small diameter rollers. The inner and outer members become an integral unit by the use of a flat wire snap ring assembled at the left. The rollers are lubricated through holes in the shaft. The snap ring helps retain the lubricating medium on that side.

Ball bearings need not necessarily be assembled against a flat sided retaining ring although the accuracy of location is probably greater than that shown in the method used in Fig. 23.

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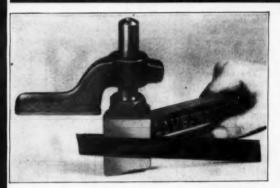
Here a one diameter hole is grooved for a round wire snap ring against which the bearing contacts. The axial position of the bearing is dependent on the accuracy with which the groove is machined. Radius at the corner of the outer race touches the wire ring at a point toward the center of each radius. If an enlarged drawing is made of the radii, this can better be determined. A line drawn through both centers shows the point of tangency. A few calculations will verify this position. In this assembly, the ball bearing has a neat press fit on the shaft, friction alone being relied upon for retention. One good point of this arrangement is that it is a space saver.

The tapered roller bearing in Fig. 24 is of the flanged cup type and is located against shoulder in the two-diameter hole. The retainer and slinger for the cone are pressed on the shaft directly behind the bearing cone. The cup retainer has a sliding fit in the hole and is forced against the bearing cup by action of the snap ring. The groove is tapered on one side. If the spring ring is made with sufficient tension. it will tend to creep up the incline of the groove thereby keeping the shoulder of the cup against the hole shoulder. This retainer is bored out to receive a felt packing ring for grease retention. The theory and shape of the snap ring groove was explained in Fig. 9 of the first installment of this article.

In Figs. 25 and 26 are shown further methods of retaining both inner and outer races of ball bearings. The shoulder ring in Fig. 25 is first pressed on the shaft after the snap spring has been assembled in the groove. This is accomplished by counterboring out the bore of the collar to a depth equal to the diameter of the wire used for the ring. Once the collar is pressed against snap ring, the latter is prevented from jumping out thru too much

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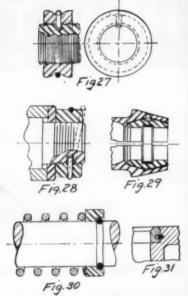
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end pressure. The same is true of the design in Fig. 26. It is possible to combine the two arrangements by utilizing a retaining collar for both inner and outer races of the ball bearing.

A snap ring so formed as to key a nut in place is illustrated in Fig. 27. The nut or screw collar is grooved deep enough to accommodate the wire retainer without protruding outside the outer periphery of the collar. the nut is in the required position, the screw is drilled with a shallow hole from the hole in the nut. The nut is then disassembled and hole in the screw enlarged a trifle, Ordinarily. tension of the ring prevents the nut from turning but if it should turn, its axial movement is limited by the clearance between the hole in the shaft and the wire diameter.

Sometimes it is not necessary to have the wire flush with the periphery of the nut as shown in Fig. 28. However, in this installation it is more important to keep the axial position of the nut correct because of the running contact between thrust washer and the memher shown at the left. The groove in the nut should not be too far from the end. The dotted lines show how the spring ring is assembled. The turned in key-portion of the ring as shown in the end view in Fig. 27 is first inserted into the hole after which the opposite side of the ring is snapped over the corner of the nut.



An interesting example of the application of a flat spring ring is illustrated in Fig. 29. It is the design of a popular collet chuck made up of a master collet with interchangeable and replaceable pads or jaws, is used with automatic and hand screw machines. The set of three pads, serrated diamond shape for gripping power, are inserted



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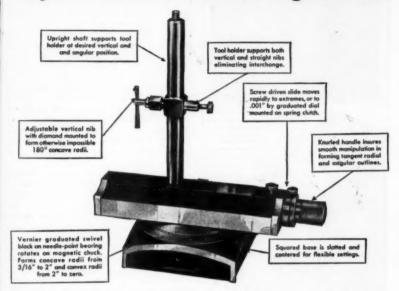
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into the master collet. These pads are grooved out approximately at the center of their gripping surfaces to accommodate a flat spring retaining ring, the latter exerting enough pressure to hold the jaws securely in place. The outer surface of each pad is radiused axially and contacts a double angular seat in the master collet. This allows the pads to rock in two directions, thereby compensating for surface irregularities in bar stock which the collet is equipped to grip. The snap ring groove is made deep enough so that the ring is out of the way of the bar stock as it is passed thru the collet. Small headed pins riveted in the master collet engage blind holes in the pads to prevent the pads from rotating.

In Fig. 30 is shown a compression spring arrangement which is similar to the ball bearing collar in Fig. 25. This collar is at the anchor end of the spring. Pressure axially keeps collar against the retainer ring which in turn locks ring in the shaft groove.

The design illustrated in Fig. 31 shows how an inserted ring, such as a valve seat, can be retained in another piece by means of a snap ring. The ring is first compressed into the deep groove in the inserted ring. When assembled, its tension is released to keep the inserted ring from vibrating loose.

The final part of this article will appear in a subsequent issue of the BLUE BOOK. Besides foreign types of installations, wire retainers of shapes other than round will be illustrated and described.

Civilian Defense

A handy 16 page Manual for Civilian Defense has been published by Amsterdam Printing & Litho. Co., Amsterdam, N. Y. There are special pages on blackouts, fires, unexploded bombs, air raids, air raid shelters, first aid, etc.

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FULL DETAILS

to attach.

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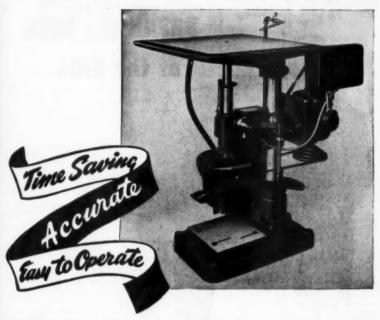
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Conservation Control

By MERRILL ORMES

THE tremendous expansion in production by armament plants has resulted in a critical shortage of skilled mechanics and other essential war production workers. For this reason, there has been much lost motion and wasteful effort. First-class supervision of the hordes of new workers is next to impossible because there is also a serious shortage of shop foremen as well.

Conceived as a nation-wide effort to aid American Industry in reaching the utmost production with a minimum waste of time, labor, and materials. Henry Disston & Sons, Philadelphia, has introduced a new Conservation Control Plan. Its basic idea is to instruct workmen in the correct choice. proper use, and right care of tools-to insure faster production, better results, and longer tool life. Moreover, the more expert application of tools and the more skilful handling of materials should result in better finished products.

Based upon a set of instruction cards called "Conservation Control Cards," the individual worker is told just how to select the right tool for the job, how to set it up properly, how to handle the particular tool, how to use it efficiently, how to keep it from breaking, how to sharpen it, how to keep it in top working condition, along with other highly important information which will mean easier and better work for him.

There are 35 of these control cards available for distribution to workers, covering cutting tools for metal, wood,

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CRIND BITS CAREFULLY TO PROPER ANGLES.

(CONTINUED ON OTHER SIDE)

Here is a sample control card. Copy on reverse side appears on a succeeding page.

Tool Bits

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VERY HARD STEEL	Boughing Finishing	3- 7 5-10	3-10 0	3-9	3-9 3-9
CAST INON	Roughing Finishing	6-10	14 0	3-9	3-9 3-9
BRASS AND BRONZE	Roughing Finishing	6- 8 14-22	4-10 0	5-9 0	5-9 5-9
COPPER	Roughing Finishing	8-12 8	16-28 16-28	5-9	3-9 5-9
MONEL METAL	Roughing Finishing	4- 8 14-22	10-16	3-9	3-9 3-9
ALUMINUM	Roughing Emistors	8 8	16-22 16-22	5-9	3-9 3-9
MACRESIUM ALLOYS	Roughing Fanishing	5- 8 10-15	3- 5	6-10	6-10 6-10



Copy on the reverse side of control

plastics, etc., including tool bits, files, hack saw blades, carboloy knives and cutters, circular metal and wood cutting saws, band saws for wood or metal, planer knives, etc.

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In addition, each card lists possible faults in operation, common difficulties, and usual mistakes in practice. The remedy for common troubles is briefly and clearly stated. It is intended that the cards be given to the worker by the foremen who can demonstrate how simple and practical the cards are. He tells the worker to have them handy for reference in case of trouble, and to have them when he starts on a new job if wishes to check up on a regular operation.

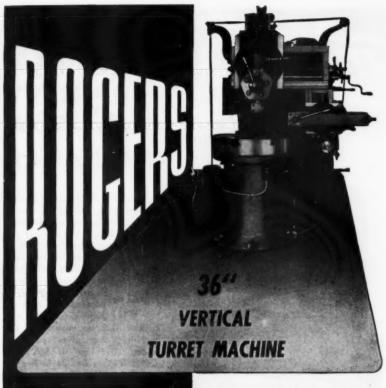
The cards not only try to help prevent carelessness, but go beyond that in recognizing that there are many readily recognized operating difficulties whose causes are relatively obscure or hidden. Disston hopes thru these cards to prevent the failures which result in miscuts and the destroying of other critical materials being fabricated.

For instance, if a hack saw blade is being used in the cutting of shell steel, both the hack saw blade and the shell stock can be destroyed. The results are obvious, but the causes may be hidden.

These conservation control cards are supplied free to any plant, whether users of Disston products or not, along with buttons bearing a seal and the slogan "Conservation Serves Everyone." In addition, there are posters prepared for use of plants generally, which "sell" the idea to the men as a means whereby their work will be made easier and better.

Emphasis is put upon the importance of saving materials in order to make more materials available during this war time emergency. The War Production Board has said concerning the plan:—"It reflects precisely what we would have every industrial plant in the country undertake."

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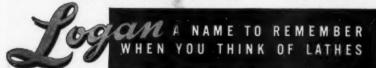
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Motor Maintenance

By C. W. FICK

R ESPONSIBILITY for keeping the machine tool industry geared to the tremendous task of producing machinery for winning this highly mechanized war rests to a great extent on the maintenance engineer. The importance of the job in evident from the fact that the machine tool industry has been ordered to increase its eight hundred million dollar 1941 production to two billion three hundred million in 1942.

The maintenance engineer's job may be divided generally into three main parts:

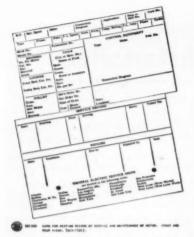
1. To prevent interruptions or outages which may be caused by accidents to or failures of the electrical service or electrical equipment in the plant.

- To keep the duration of interruptions which do occur to a minimum.
- 3. To plan for increased loads and extensions of electrical service,

The first step in preventing interruptions is to keep an up-to-date list of all electrical equipment in the plant. This should account for every motor, control box, transformer and circuit breaker, as well as electric cables, in terms of size and rated capacity. Next, a regular schedule of inspection must be set up so that the load carried by the electrical apparatus, as well as the condition of the apparatus, is known. If nothing is done until failures actually occur, they will begin popping all around. Production managers are calling for increased output on each ma-



Periodic oiling of motors prevents bearings failures, especially important today because of the scarcity of bearing materials. Bearings in motor shown at left are flushed with carbon tetrachloride. Relief plug is replaced and a small amount of lubricating oil is injected. This is allowed to churn for a few moments before draining. On ball bearing motor at the right, grease is injected with motor running until excess is expelled thru relief hole. This eliminates hardened grease and makes it easy to add the correct amount of new lubricant.



chine. If the maintenance engineer knows what that means in the load on his electrical apparatus, he can work closely with the production manager or with the foreman to see that production is not stepped up to a point where failure of the electrical apparatus will surely occur.

It should not be necessary for motors to squeal for lack of oil, or smoke from overload, before their condition is checked to see what can be done about it. The oil in transformers and oil circuit breakers is expected to serve an insulating, cooling, or arcquenching medium. However, oil can deteriorate gradually with the result that these characteristics are impaired. Breakdown of equipment has more than once been due to the fact that the dielectric strength of the oil was not what it should have been, or that the oil level was not maintained. Such accidents are really a reflection upon the care and attention given by the maintenance man. Not always, but sometimes. In those cases the accident could have been prevented by the regular inspection schedule.

Transformer supervisors occasionally find an ancient or heavily overloaded transformer in which the oil has congealed to a jelly-like mass. Obviously, in that condition the oil cannot do the job expected of it, either as an insulating or cooling medium.

Motor bearings fail because of lack of oil, and with the heavier and higher speed machines, the results of bearing failures can extend beyond mere bearing replacements. Sufficient heat may be generated to spring the shaft, or the rotor may rub on the stator damaging the laminations with a consequent expensive repair job. In these times it is more than ever necessary to prevent bearing failures because of the scarcity of bearing materials. Copper, tin, and antimony, which go into the makeup of the babbit, are now on the critical list.

Improper brush pressure can result in flashovers of commutators, or arcing at collector rings. It is such an easy matter to keep the brush pressure at recommended values that there is really no excuse for troubles of that sort.



Oiling Tri-clad squirrel cage polyphase induction motor, used to drive a small grinder.

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In many plants the wires and cables are being called upon to carry excessive loads. The cables themselves may not show distress, but they may have been figured for a certain voltage drop at normal currents, and when these currents are greatly exceeded, the voltage delivered to the motors or to the apparatus may not be sufficient to permit the machine to do its job properly. A 10 per cent voltage drop results in a 19 per cent loss of torque in the case of an induction motor. That actually means a decrease in the production of the machine driven by that motor, and today we are looking for increased, not decreased, production. Keeping Outages to a Minmium

The wise maintenance engineer realizes that some failures may occur even the he takes every precaution to prevent them. Experience and a careful check on loadings will generally indicate possible danger points. The best procedure is to (1) have spare parts

available; (2) if possible have a spare machine ready to install in place of the one that may fail; and (3) know where each type of apparatus can be repaired most realiably and quickly, so that in case of failure, no time will be lost in locating a suitable repair shop. This is good information to have on the card record of each machine.

Planning for Extensions of Service Where a new machine is to be added,

it is often possible to simply extend an existing cable run without overloading the cable or causing excessive voltage drop. This should be done intelligently, of course, knowing both the capacity of the cable and the load it

will be called upon to carry.

Major plant extensions, on the other hand, will require entirely new feeders, and in such cases it is suggested that specialists be consulted. Incorrect methods of supplying power to new plants and to plant extensions cost excessively and waste materials. Studies have been made which prove that the load-center distribution method of supplying power offers many advantages as discussed in the lead story in the



A hook-on volt-ammeter Type AK-1 offers a handy method of measuring motor cuttent.



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May Blue Book. In this method, a factory-built unit substation is installed at the load center and fed by highvoltage cable, in contrast with the older method of bringing the highvoltage cable to an outdoor substation and then having long runs of lowvoltage cable. The unit substation method permits the use of smaller transformers, which in turn permit the use of smaller rupturing capacity breakers, and it keeps the length of runs of heavy, low-voltage cable to a minimum. Time is saved in the installation of such a distribution system, and frequently the cost is reduced by 20 per cent.



Switchgear with removable breakers permits easy withdrawal on a transfer truck for thoro inspection.

To sum up, the maintenance engineer's job is, first, to know at all times the condition of his apparatus; second, to know the loads the apparatus must carry; and third, correct the weak points before they fail.

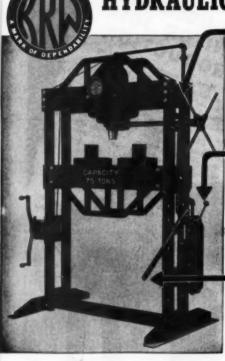
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Carbide Tools on Large Machines

By FRED W. LUCHT

UNTIL recently, there was little interest among manufacturers in the idea of applying carbide tools to large machines such as boring mills, large vertical turret lathes, engine lathes, etc. Not only were such large machines rarely run on a continuous basis, but most of these machines were also of older types and designed for low speed cutting (25 to 30 fpm), were insufficiently powered to use carbides, and lacked the rigidity required for higher-speed operation.

Today the situation is different. Many a large machine is on the critical list. Production on such machines has had to be stepped up under pressure. It is not surprising therefore, that there is a sharp increase in the use of carbide tools on large machines today.

Fundamentally, there is no reason why carbide tools cannot be applied successfully to most large machines, particularly those of the newer designs brought in by the war program. These later machines are built with greater rigidity and for higher cutting speeds than their earlier prototypes and are usually higher-powered.

Carbide tools were originally used only on cast iron and non-ferrous machining operations. Even on these materials they were restricted to continuous cuts for a long time after their introduction. It was widely believed that they lacked sufficient strength to han-

dle interrupted cuts. When carbide tools were tried on such cuts, tool breakage sometimes occurred. Toolbreakages were also caused at times by sand in the castings, big run-outs, heavy scale, etc. Now this picture has changed completely and carbide tools take right in stride, the whole gamut of interrupted cuts, even on the harder and tougher steels, from cut depths of a few thousandths on precision boring machines to cuts 1" deep on large tank parts.

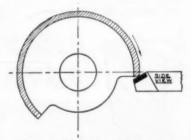


Fig. 1—Sketch illustrating the "shear" cut obtained with the newer negative rake Carboloy tools now widely used on machining large work with interrupted cuts. Note that impact load is decreased and also is not concentrated on point of tool.

Among the factors which have contributed to broadening the use of carbide tools in this direction, as well as on large work and large machines generally are:

- Vastly increased knowledge of proper speeds and feeds as well as improved clamping fixtures, rigid tool holders, etc.
- Better determination of shank and tip sizes required for handling heavy cuts.
- 3. Increased knowledge of tool shape and cutting angles. For example, the development of negative back rake angle tools which have contributed greatly. In some instances, these negative back rakes have been carried to an extreme degree to obtain a shear type of cut. (See Fig. 1 and 2).

These have contributed materially toward the ability of carbide tools to handle interrupted cuts on large work. The tools are so designed that the impact following an interruption is minimized

- by gradual entry of the tool into the cut, since with a negative back rake, the initial load is taken back away from the nose of the tool.
- or the tool.

 4. The general adoption of centralized grinding rooms for reconditioning single point tools as well as reamers, drills and other endcutting tools. The centralized grinding room assures proper grinding of carbide tools by trained grinder hands and at the same time saves costly time which is irretrievably lost when the machine operator takes time out to grind his own cutting tools.

Another factor responsible for the increased use of carbide tools on large machines is the ability, today, of shops to produce their own carbide tools by tipping shanks with lower priced Carboloy tips, reducing costs, avoiding de-

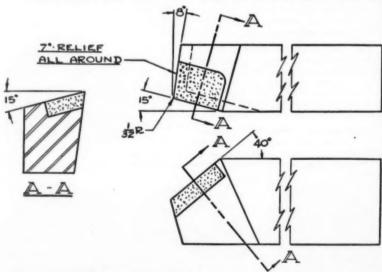


Fig. 2—Tool with extreme negative rake used to obtain a "shear" cut. This tool is best suited to roughing cuts on large diameters. It is not recommended for most finish cuts because chip curls toward work and spoils the finish.



Since the advertisement at left appeared in 1940, there has been widespread adoption of the "Michigan" cross-axis shaving process for finishing aircraft gears to multiply output and cut costs—while IMPROVING QUALITY.

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lays, decreasing tool salvage loss, etc.

On the whole, however, the question goes back to greater knowledge of the problems involved in applying carbides to large machines. Only recently has there been a sufficient volume of interest along these lines to permit devoting considerable time and effort to the problem on the part of user and tool manufacturer.

Advantages of the use of carbide tools on large machines may be summarized:

- Increase of cutting speed permits a reduction in feed, insuring better finish, without reduction in metal removal. (Since higher cutting speeds go hand in hand with maximum efficiency and output, the machines should be capable of running at speeds about 2 to 4 times those normally used with H.S.S. it is claimed.)
- 2. Lighter feeds permit use of lighter fixtures, of simpler design and lower cost—quicker to build. (Best results were obtained when the feeds were held below 0.30°. The lower feeds as compared with ordinary H.S.S. practice were in practically every instance more than offset by the higher cutting speeds employed.)

 With lighter fixtures, lighter, thin-wall parts can also be machined faster and more effectively. Parts do not have to be chucked or fastened so securely —avoiding distortion.

-avoiding distortion.
4. Carbide tools usually provided longer tool life per grind, reducing down-time, set-up time, etc. (Shanks must be large enough to take care of the tool overhang which is frequently of considerable magnitude on large boring mills. Charts are available for selecting correct shank and tip proportions).

5. Carbide tools permit the ready machining of harder materials,



longer is it necessary to sacrifice cutting ability to overcome breakage, spalling, and mushrooming.

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ly ls, such as armor plate castings and forgings and heat treated alloy steels of 300 to 500 Brinell hard-

6. Operators turn out more work with less effort. Do not have to replace and grind tools so often, or check as often for changing dimensions due to tool wear. (A centralized grinding room is an important factor in obtaining maximum performance of both machine and cutting tool.)

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In putting carbide tools to work on large machines we have frequently found that the advantages gained far exceeded the results attributable to carbide tools alone. Many large machines are operated on the basis of antiquated practices handed down from year to year and from decade to decade.

The mere introduction of a "new" element, such as carbide tools, has permitted in many cases reorganizing of machining practice in a manner which would have been difficult to accomplish without the introduction of a relatively new and unknown factor.

Prime among shop practice improvements along this line have been:

1. "Planned" cutting.

Adoption of tool-setting devices for quicker set-up.

Greater usage of machine dials as a check on cutting.

"Planned" cutting means nothing more, really, than changing the order of cuts, etc., in order to remove stock in the fastest way. It is surprising how little deductive reasoning is applied to this question in some plants—such as the rough facing of a part before turning to reduce the excessive run-out of the work (see Fig. 3). This may not only reduce travel of both the turning and boring tools but will also enable them to start the cuts in clean metal instead of rough scale, allowing these tools to hold size better and tending to reduce the floor-to-floor time be-

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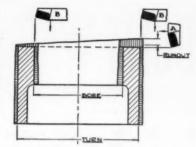


Fig. 3—Tool "A" takes facing cut removing scale and runout on back of casting. Tools "B" then take turning and boring cuts. This practice enables tools "B" to hold size better thruout entire length of cut since they start in cleam metal.

cause of less time required for changing dull tools. In some cases it has been found possible by "planned" cutting (plus carbide tools) to reduce machining time by many hours. Cutting a 30 hour machining job down to 8 or 10 hours by such simple expedients is no longer regarded as unusual.

Adoption of some form of tool setting device for quicker set-up is another factor which can contribute materially to increased output. It's not a bad idea to adopt a "get rid of calipers" slogan. Indicators, simple tool setting gages as part of the fixture, and the use of machine dials may be used to speed tool set-up.

Checking the machine dial setting when changing tools provides a surprisingly accurate method of speeding tool setting. Most operators don't trust these dials—based on experience with older, less accurate machines and dials. Use of ground lead screws, accurately marked dials, etc., on most of the newer machines has changed the situation.

On some jobs, where chip interference does not prevent, another useful trick to speed tool setting is to permanently clamp an indicator on the cross-slide.

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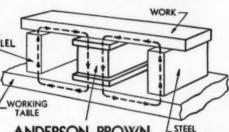
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Huge Expansion in Arc Welding

By R. F. WYER

In the arc welding field, last year was one of almost unbelievable expansion, rather than a year of new equipments. The relatively small number of new devices resulted not from a lack of foresight or ingenuity, but from the pressure for shipbuilding, armament, and related fabrication which placed a tremendous load on the engineering and production facilities

of equipment suppliers. It was a year in which the new developments and refinements in design of previous years were utilized to the full by manufacturers and users alike.

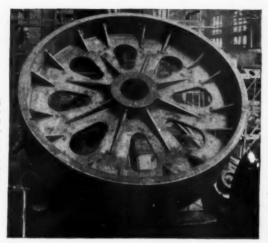
There were some remarkable developments in the application of arc welding equipment and the arc welding process. Some of these were unique

*Welding Engineer, General Electric Co.



Arc welding is used extensively in the construction of new all-steel cars and the repair of existing cars.

A 7½ ton revolving field spider for 6500 hp synchronour motor, fabricated by are welding in G-E shop. Circumferential fillets joining web to rim welded in flat position automatically with ¼" heavily coated electrode. Other joints welded manually in flat position with ¾" electrode.



because the products involved had never been built before. Others were of particular interest in their demonstration of the versatility of arc welding and its ability to provide lightness and strength unobtainable by other fabrication means.

In the manufacture of gun mounts, for instance, cellular elements are now fabricated by bending and arc welding thin sections of alloy steels especially selected for weldability. The resulting structure gives the strength required to withstand the shock of firing the weapons, and the light weight necessary for easy portability.

In aircraft manufacture, the adoption of arc welding for SAE-4130 and X-4130 steel tubing, plates, and forgings has been widespread, and will undoubtedly go farther as confidence in this application is gained by experience. One of the equipment developments of the year was the aircraft welder, a single-operator, direct-current unit of special design intended to give the ultra-stability and ease of arcstarting required on thin, clean ma-

terial. While makeshift methods were used to some extent to provide extra stability for units of conventional design, it appears likely that the ease and efficiency of operation required for maximum utilization of arc welding in this field will dictate the use of machines particularly designed for such

applications.

This same field of application focused attention on the need for extremely close control of the welding current, and on the frequent necessity for tapering off the current at the end of the bead in order to prevent the formation of a crater when the arc is broken. To meet these needs, special remote control devices were developed. In addition to the switch-in-handle control already in use in several plants. a foot-operated control was produced. By means of this device, immediate response to every requirement for a change in welding heat may be obtained, whether slow or rapid. An additional feature provides a hot start, or a guick increase in current when needed. This is particularly useful.

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not only in obtaining adequate fusion at the beginning of a bead when the electrode and the work are cold, but in permitting the operator to increase the welding heat to give thorough penetration where heavy stock is encountered or when burning into a previously deposited bead.

Quick reduction in heat which can be produced with such control is equally valuable in enabling the operator to compensate instantly for any tendency to burn through the work at points of poor fit-up or low heat conductivity. The average welding heat can thus be selected for best results from the point of view of speed and quality, yet the operator is not bothered by cold starts or the danger of burning through.

Probably no development emphasized more strongly the role of arc welding in the war than its application to armor plate fabrication. All the publicity which was given to this phase of Ordnance production, however, could not have conveyed to the general public

any idea of the resourcefulness, speed, and energy with which this problem was attacked by the industry long before the situation reached its present urgency.

One aspect of the arc welding field increasingly stressed was the importance of proper application of equipment in assuring minimum consumption of electric power. While the cost of power is recognized as a small part of the cost of welding, the increasing threat of a power shortage has forced attention to this factor. In the d-c field. this has resulted in the use of hundreds of constant-potential, multipleoperator welding generators in shipvards, where the factors favoring their installation are usually found. The urgency of the power problem will probably extend the application of this system to other fields during 1942.

Alternating-current welding received impetus from two sources—the need for conservation of power, and the imperative demands for speed and qual-



Arc welding is reported to have shown a saving of 40% in production time and 30% cost reduction on these arc welded truck bodies for war zones.





Using an atomic hydrogen are welder in die repair work at the Underwood-Elliott-Fisher Company.

ity in difficult or heavy work. To further increase the benefits of a-c welding, equipment manufacturers extended the use of power-factor correction built into the welders. In many instances, the over-all power factor of entire plants was improved by the corrective kva afforded by such welders.

One of the significant trends was revealed in the attention paid to the safety, comfort, and convenience of welding operators, as evidenced by the use of high-grade accessories such as ventilated welding helmets, and fully insulated electrode holders. This movement toward the insulation of all electrode holders, regardless of the type of work or welding circuit with which they are to be used, is expected to continue.

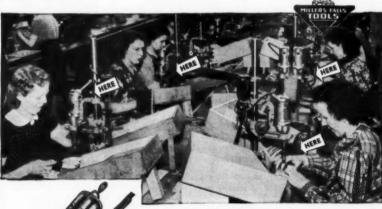
Although representing no outstanding new developments, the steadily increasing use of atomic hydrogen are welding for the repair of vitally needed tools and dies is a good indication of the sometimes indirect method by which welding keeps production rolling. Likewise, the increasing use of arc welding in building fabrication. pipeline construction, and machine tool fabrication played no small part in the phenomenal growth of our productive capacity.

A less tangible, although no less important, development in 1941 was the better receptiveness of the industry to new ideas, equipment, and procedures. Particularly since the episode at Pearl Harbor brought home to everyone the primary importance of production to our national existence, a perceptible change in the philosophy of the industry has occurred. It is safe to predict that in continuance of this trend, decisions based on habit, prejudice, or commercial considerations will give way to those in which the sole consideration is the furtherance of our national war efforts.

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"WORK SIMPLIFICATION" and SPEED-UP begin here

For the vastly increased production now called for under the Victory program, industry is looking to "work simplification" and speed-up... largely a process of adding the right electric tools in the right places, through careful job analysis. In the foreground of such planning in thousands of plants are Millers Falls portable electric tools, built for trouble-free service on dozens of repetitive operations. Millers Falls drills, nut runners, screw drivers, grinders, sanders, and hammers — well-spotted, applied according to plan — are saving precious time, cutting production cost.



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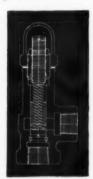
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Spindle speeds with 1800 RPM motor

Foods per revolution of spindle

Bearing of arm on column Size of main driving motor Height of drill column over gears Working Surface of Base Not weight

3' Arm	4' Arm		5' /	1rm
731"	96"	120"		
3,	48"			h.**
104"	15"		17	* !** !**
104"	48" 16" 10"		10	,
No. 4	No. 4		No.	4
24"	24"		2	
241"	361"		48	
(60, 85, 130	, 180,	on	ali	models
(425, 560,	860,			
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(560, 860, 1	1160,			
(.004" .007	10	on	all	models
102" 94" No. 4 24" 251" (80, 85, 130 (425, 560, (1200 RPM (85, 130, 1) (860, 860, (1750 RPM (.004" .007" (1760 RPM (.004" .020" 28 PP 28 PP 28 PP 4000 lbs.	40"		41	
2 HP.	2 HP.	2 HP.		
89"	98" 36"x60"	38" 30"x88"		
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Sanding Away Production Bottlenecks

HE importance of finishing operations in war production industries cannot be too strongly emphasized. These operations consume time, and what is often the case, it is the time of skilled workmen which could be used more profitably elsewhere. Hence, the application of reciprocating and other type sanders on hundreds of finishing applications has provided the answer to many finishing room "bottlenecks." Not only are these machines reported to save from 50 to 80% in time, labor and abrasive material, but a more uniform finish results, and ease of operation permits the use of unskilled labor even on precision work.

The reciprocating action of the machines illustrated is said to duplicate the motion of hand work at 3000 strokes per minute, as compared with a maximum of 150 by hand. This action is helpful on all finishing operations following disc type, belt sander, or grinding machines. To illustrate the advantages of such equipment, a few specific examples are given.

The Airplane Parts Division of the Briggs Mfg. Co. are now using approximately 70 of these units for cleaning and removing oxidization from aluminum parts before spot welding.



Fig. 1-Sanding a filler coat in the plant of a machine tool manufacturer.



Fig. 2—Sanding filler on casting in the printing machine plant of Vandercook & Sons.

Areas cleaned vary from 1½" to 3¾" in width. A standard pad (3¾") is suitable for most of these parts, but on the smaller parts, special pads from 1½" to 3¾" are advisable. On this application No. 240 or 280 aluminum oxide open coat abrasive is used. Twice over the surface with medium pressure does the work with a material saving in time and abrasives.

In the manufacture of propellers, these machines are used for removing scratches from the duraluminum propellers following belt sanding operations. A slightly coarser abrasive than that of the previous belt sanding operation is used here. For example instead of No. 150 belt, use 120 on the reciprocating sander. This work can be done either wet or dry. If a lubricant is preferred, a light oil or kerosene mixture is used.

These machines are also widely used in the maintenance of aircraft and propellers. The major application on propeller work is to eliminate, by featheredging, the pits which develop during use, caused by striking pebbles or other debris. For the first cut a coarse abrasive paper (No. 50, 60 or 80 aluminum oxide) is used. On general clean-up work Nos. 120 to 180 are recommended, with 220 to 320 aluminum oxide open coat for final finish. These mainte-

nance applications are entirely dry.

Airlines operating on the seaboard have a different application. Their problem is to remove corrosion from the propellers caused by salt water spray. For first cut No. 240 wet or dry is used followed by 360 and 400 using a varnish solvent as a lubricant.

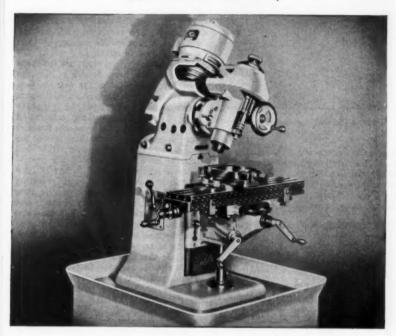
These sanders are also used for finishing aerial cameras. When the die castings are received from the presses, they are discolored from the heat. The problem is to remove the discoloration and apply a grained finish without turning the edges of the soft aluminum. No. 80 grit is used for the first cut, finishing with 120, and the result is a beautiful finish with substantial savings in time and abrasives.

In the civilian field, these machines are extensively used in the maintenance and repair of refrigerators, stoves, washing machines, etc. that have been damaged in shipment or in stor-



Fig. 3—Sanding plastic forms at J. P. Seeburg Corp. plant, where automatic musical instruments are made.

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Fig. 4—Sanding the surface of steel railroad cars.

ing. On this work, the machine is used for feather-edging scratches and other damaged spots. No. 100 or 240 aluminum oxide open coat abrasive is used dry. These repairs can be made in the store, warehouse, or home.



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KAEBELITE

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for all Industrial Purposes. Another use of this type equipment is in sanding down soldered areas. This application is particularly common to automobile reconditioning or fleet maintenance. After first removing surplus solder with a rasp or portable grinder, the sander follows, using Nc. 80 aluminum oxide dry open coat paper. Not only does the use of the sander on this application result in a better finish, but a worthwhile saving of time and abrasives is effected.

A particularly important use for these machines has been found in the die industry, especially in the manufacture of cast iron forming dies for aluminum airplane parts. Prior to the introduction of the reciprocationg sander on this application, the general practice was to polish or hone these along the edges by hand. However, this left minute lines which caused the aluminum to scratch or tear. Using No. 180 aluminum oxide cloth and polishing the radii in the direction of the flow of the metal, a satisfactory finish is obtained in much less time, but the main feature is that the lines left by previous methods are eliminated, and a great waste of metal is avoided.

While this article has delt principally with electric reciprocating sanding machines, other types such as pneumatic sanders are also in wide use in the war industries. Further articles in succeeding issues of The Blue Book will describe some of these other types.

*Photographs Courtesy of Detroit Surfacing Machine Co.



from 10° below horizontal to 10° past perpendicular. Spindle toper #98&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T).

Head swivels and locks

numbers to 100 (except 96T). Write for bulletin.

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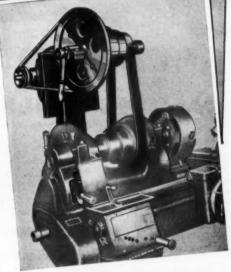
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The column, is cast of solid piece with five board holes to bolt to the machine.

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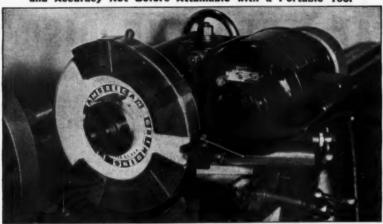
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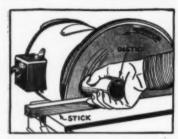
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"Let's Talk Shop!"

Diamonds on the Job

By John E. Hyler

F everything that quantum done and are doing for industry could be fully demonstrated in one place, we would appreciate them even more than we do now. We have, in diamonds and diamond tools, an advantage that is greater than we ordinarily realize. In the field of precision boring, the diamond tool and the diamond tool boring machine have earned a definite place. One builder of diamond boring machines which I have encountered in the past, is in position to furnish multiple spindle machines as well as those of single-spindle type. The high degree of accuracy obtained, together with the glass-like finish on the bores produced, eliminates subsequent reaming, scraping or broaching. This is certainly well worth thinking about,

Did you ever hear of drilling a hole thru a diamond itself? It is done in the case of making tiny diamond dies, used for drawing fine filament wire. How would you drill a diamond? With needles and diamond dust, for nothing softer than the diamond itself is capable of doing the job. It is about the only case I know in which powdered

diamonds are used for drilling purposes. But powdered diamonds are furnished by some of our diamond specialists and are considerably used for lapping and polishing. The diamond powder may be had in dry form or compounded with a lubricant, as desired.

It is possible to salvage diamond powder for use in a lapping paste, by crushing up what is left of diamonds in outworn grinding wheel dressers, but while some claim to have done this to advantage, I doubt whether it is as successful as buying the powder directly, for powder that is purchased is carefully graded or meshed for size of the particles, and may be had in as many as 10 standard sizes. In making it up from old diamonds, the process usually involves the use of a hardened steel mortar and pestle, and after the diamonds have been as thoroly crushed as possible, the powder is placed in a container of olive oil, and is thoroly stirred. Then it is allowed to stand for a brief interval, when the oil is poured off into another container.

It is obvious that the heavier and coarser particles of the powder will



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be left in the first container. It is then allowed to stand in the receptacle into which it has been poured for another time interval, and then the oil is poured off again into a third receptacle. Repeating the process, one can separate with some degree of accuracy as many different grades or sizes as he chooses, the very finest portion of the powder, of course, remaining in suspension in the oil the longest of all.

In the purchase of diamond tools, it is always important to remember that particular kinds of diamonds are best for specific types of jobs. For that reason it is wise to obtain such tools from a reputable firm that has been in this business a sufficient length of time to accumulate the experience essential for furnishing the right diamond for the right place. There are firms which have been working in this field for a considerable time. Such companies naturally have led in gearing diamond tools into production programs.

think of One cannot diamonds without thinking of dressing tools in which they are mounted, and it is a fact that some of the modern developments along this line are of prime importance. Take the accurate dressing of radii on wheels as a case in point, at the surface grinder. radius dressers into which the diamonds may be set by micrometer in order to obtain the highest degree of radius accuracy. The tools will dress either a male or a female radius on a wheel, as may be desired. They are simply held on the magnetic chucks while in use, and will convert the wheels into the required shapes without tearing down the machines. Consequently, the dressing jobs may be done in a very short space of time.

As to the actual mounting of diamonds in dressing tools proper, it is interesting to note how various tool makers have vied with one another in the matter of mounting the diamonds. Some of these methods are protected by patents. I recently noted a new method of mounting, which goes under the trade name of Brostite, for which patents have been applied. It is claimed that this proc-



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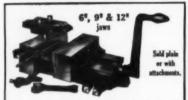
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ess makes a superior dressing tool at a low cost, and since it is the development of a reputable manufacturer, there is very reason to believe the claims are true. There are other ex-cellent methods of mounting.

One importer of industrial diamonds has gone to considerable length in the matter of furnishing different types of diamond dressing and truing tools. They may be had with a single diamond in the center, or with a number of smaller diamonds. Tools are furnished



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Save countless toolmaking hours by using this many - purpose vise instead of making jigs and fixtures for repeat-operation work on drills, planers, millers, shapers, grinders. Various special jaws available. Also sold plain.

KNURL HOLDER FOR LATHE TURRET

By angular adjustment, this tool makes many patterns of spiral, straight and checkered knurling all with the same pair of straightcut knurls. Shank to fit your turret. Also made to pass over stock of larger diameter than section to be knurled.

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with different styles of nibs to suit different types and designs of grinders. If one has any doubt as to just what he should purchase for best results, it is advisable to put the problem directly up to the firm from which the tools are to be purchased, so they will be responsible for results. You will find makers of diamond tools are willing. not only to make recommendations as to tools that should be used for given types of duty, but some of them have gone so far as to publish booklets of instructions for the use of such tools, to be placed into the hands of men who are coming into contact with diamond tools for the first time.

There is a difference of opinion among different makers of diamond tools, as to the best material to use for a matrix in mounting diamonds, and in consequence these materials differ. One outstanding maker of tools and importer of commercial diamonds that I have noticed, uses a special nickel alloy for the purpose. Then there are those who prefer to use a matrix of sintered tungsten carbide. I know of two highly progressive firms that use tungsten carbide for holding diamonds in wheel dressing tools.

In the making of diamond wheels, it is interesting to note that one manufacturer has turned to the use of a genuine and an unsintered metal bond, and it is claimed that his diamond wheels, which are made in grades all the way from 80 to 400, will grind at a much faster rate without affecting the temper of materials ground. They are especially recommended for the grind-

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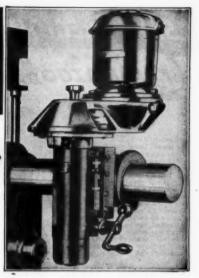
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Sold direct, factory to you, or your nearest dealer. Many machines in use. Tried and tested in machine plants for 2 years. Each head is unconditionally guaranteed for six months.

Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14230 BIRWOOD AVE.,

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SAVE PRECIOUS TIME!

KALAMAZOO BAND SAW

ICTORY

Victory depends on production speed if he Kalamaroo Band Saw is already saving vital time in hundreds of war plants. In-quantous basic design plus sturdy, ball-bearing construction throughout give it positive accuracy that saves precious steel and hours of machining time. New hydraulic controls make it possible to cut to within thousandths of an inch! Hydraulic cushioned action. Completely portable—saves set-up time. Cuts all shapes! Write for specifications and information on prompt deliveries.



MACHINE TOOL DIVISION

ing of hardened steel tools, tungsten carbide and other like work.

The wheels mentioned, because of their very strong bond, may be run at a high rpm rate, and may be readily cleaned if and as necessary with soap and water. It should be remembered in grinding with diamond wheels of any make, especially in connection with carbide tools, that the quality of edge produced on the tools and also the life expectancy of the wheels are both in some measure dependent upon the use of a proper lubricant. There is a special diamond lapping oil that is recommended over ordinary lubricants, which has done and is helping produce better results.

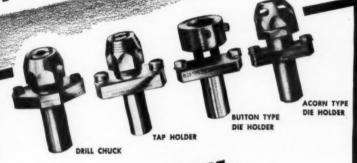
There are times when diamonds require re-mounting. Bear in mind that where this is the case, some of the better firms are in a position to re-mount them, and to do it in a minimum of time. One that I have in mind, particularly, will supply diamonds in vari-

ous types of mountings, and in addition, offers the re-mounting service mentioned.

As to the size of the diamond that should be used in an abrasive wheel dresser, that is a matter which varies under different conditions, and here again is a point that is well left to the judgment of the firm from which you are purchasing, if you give them pertinent data relative to the conditions under which the dresser will be used. Some firms are prepared to supply them in any size from ¼ to 10 carat, in any type of holder desired. In general, however, the size of diamond it is best to use will vary directly with the area of the wheel face, so that one can figure rather closely under most conditions. The usual 6" wheel will require a 1/2 carat stone, and an 8" wheel or ordinary face width, 34 carat. For a 12" wheel, use about a 1 carat diamond; for a 20" wheel a 2 carat, and for a 30" wheel, 3 carats, etc.

One interesting thing that has been

PUT THEM TO WORK!



FOR DEFENSE

against profitless production, eliminate slow, obsolete methods.

ALCO TOOLS make possible faster set-ups, cut out costly bushing inventories Perfect internal or outside threads cut to meet the most rigid government specifica.

and all bushings expense.

Prompt shipments are now being made of Alco Drill Chucks, Alco Tap Holders, Alco tions and held to close tolerances for the entire run.

Button Type Die Holders, and Alco Acorn Type Die Holders. log for quick reference. Write for list of representatives in the U.S. and England.

alce-700 Ls

Housatonic Ave., Bridgeport, Conn.

Detroit Office - 988 Stephenson Bldg.

done in a line of diamond dressers made by a progressive firm, is to make a special provision for heat dissipation. Getting rid of the heat rapidly, as it tends to build up in the diamond and its mounting, while it is being used for dressing, is claimed to result in greater dressing accuracy, and this is doubtless true. The firm that does this is one that provides diamonds in 3 different grades in 3 different price ranges, and will provide contour template diamonds in the 2 highest grades when desired.

There are those who prefer the use of multiple-point diamond dressers, in which a number of small diamonds are set in a matrix, rather than having a single diamond point of larger size to do the work. The multiple-point dressers are recommended by those who make them, for economy as well as efficiency. While not quite so versatile as the single-point dressers, possibly, there are many places and cases where they may be used to advantage.

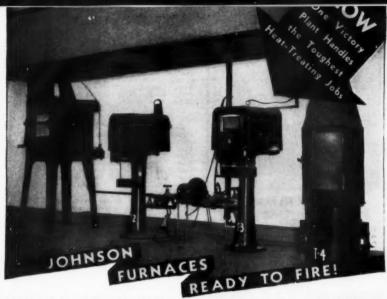
where they may be used to advantage.

It should be mentioned perhaps that

where there are many different angles on wheel faces to be dressed, one should have a special angle dressing tool. A very good one that I have noticed consists of a base block of rather heavy type which can be held on the table or on a magnetic chuck. Pivotally mounted on one side of this block is a second block, something more than a semi-circle in general contour. with the flat portion on top providing a slideway for the portion of the device that carries the diamond. With these adaptations, and by means of graduations to allow for setting the device at any desired angle, the dia-mond may be traveled in any predetermined angular path within the scope of the device, producing the same angle on the wheel face. When desired for extreme accuracy, such devices may be had in vernier types.

While more might be said, it is believed this is sufficient to remind us of the importance of industrial diamonds and their proper use. It will pay to consider them well, in order





The above photograph shows the heat treating department of a large manufacturer of Bomb Tail Fuses. The equipment consists of one Johnson Drawing and Tempering Furnace No. 820; one Johnson Hardening Furnace for Manganese Moly Steel No. 130-LT; one Johnson No. 130 High Speed Steel Hardening Furnace; one Johnson No. 550 Liquid Hardening Furnace with Standard Hood.

All Johnson Furnaces Reach Maximum Temperatures in Less Than 30 Minutes

When you want to speed production, utilize your floor space to the best advantage, and save up to 50% on gas consumption over ordinary units, install Johnson Furnaces.

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FURNAGES 601

INDUSTRY

MORE THAN 40

For over 40 years these Johnson Furnaces have set records for producing more work in less time, at less cost. There's a Johnson Furnace for every job requiring heat.

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HOWE-LINDSEY AUTOMATIC SHARPENING MACHINE

Is designed to sharpen back saw blades, metal band saw blades, and with the circular saw attachment, circular saws, metal slitting saws and milling cutters up to 5/16s face. Fully automatic and has a constant maximum speed of 83 teeth per minute.

Write for circular.

HOWE & SON, INC. HINSDALE, N. H.



LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, re-

gardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Pres-Vac Safety Feeders, REQUEST BULLETINS. Mechanical Pickers, etc.

F.J. LITTELL MACHINE CO 4153 RAVENSWOOD AVE. CHICAGO ILL

that they may have all the attention they rightly deserve. EDITORIAL NOTES:

1—Builders of diamond boring machines are Automatic Machine Co., Bridgeport, Conn.; Cross Gear & Machine Co., Bellevue Ave., Detroit, Mich.; Ex-Cell-O Corp., Detroit, Mich.; The Heald Co., Worcester, Mass., and others.

2-j. L. Hanifen, 410 E. 57th St., New York City specializes in powdered diamonds.

3-Firms always ready to recommend the 3—Firms always ready to recommend the right diamonds for the jobs include:—Acme Diamond Tool Co., 15 Maiden Lane, New York City; Diamond Tool Co., 935 E. 41st St., Chicago; E. Karelson, Inc., 56 W. 45th St., New York City; Koebel Diamond Tool Co., Detroit, Mich.; Anton Smit & Co., 24 State St., New York City; K. Smit & Sons, Inc., 157 Chambers St., New York City and others.

4-Radius dressing tools for precision dressing of grinding wheel contours are offered by Schultz & Anderson Co., 109 A Edison Place, Newark, N. J. and Welch Industries, Inc., 19900 W. 8-Mile Road, Detroit and W. F. Myers Co., Inc., Bedford, Ind.

5 — The "Brostite" method of diamond mounting is used by Christensen Diamond Tool Co., 3684 Willis Ave., Detroit, Mich.

6—Industrial Diamond Co., 7 Avalon Av.,
Detroit supply diamonds for hardness testers
—also wheel dressing tools.

7—A book of instructions on the use of diamond tools is published by Koebel Didmond Tool Co., Detroit. Interesting and instructive house organs on the use of industrial diamonds are published by J. K. Smit & Sons, Inc., 157 Chambers St., New York and Anton Smit & Co., 24 State St., New York City.

8—F. F. Gilmore & Co., 112 Dartmouth St., Boston, Mass., mounts his industrial diamonds in a special nickel alloy.

9—Two firms that set their diamonds in tungsten carbide are Willey's Carbide Tool Co., 1344 W. Vernor Highway, Detroit, Mich., and Dic-Tool Inc., 320 Yonkers Ave., Yonk-ers, N. Y.

10—The diamond wheel manufacturer using an unsintered metal bond for diamond wheels is Mustwin Metal Bond Diamond Wheels and Tools, 205 W. Wacker Drive, Chicago.

11—Special diamond lapping oil is supplied by Stadoil Mfg. Co., of Dallas, Tex., and Los Angeles, Cal.

12—A diamond tool manufacturing firm that will remount diamonds promptly is Desmond-Stephan Mfg. Co., Urbana, Ohio.

13—Diamond mountings with special provision for heat dissipation are offered by J. K. Smit & Sons, Inc., 157 Chambers St., New York City: Diamond Tool Co., 935 E. 41st St., Chicago, and The Staset Co., Inc., 70 Franklin Ave., West Orange, N. J.

14—Multiple point diamond dressers are offered by W. F. Myers Co., Bedford, Ind., Anton Smit & Co., 24 State St., New York City; Koebel Diamond Tool Co., Detroit, Mich.; J. K. Smit & Sons, Inc., 157 Chambers St., New York City, and others.

SHELDON Back Geared Screw Cutting PRECISION LATHES







For the Tool Room

• The finest 10', 11' and 12" lathes ever built in the moderate price field. Large special analysis steel spindles ground all over, with extra collet capacity. Hand-scraped Bronze, Ultra-Precision Ball or Super-Precision Roller spindle bearings, (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat These lathes come with a wavs). choice of aprons, gear boxes, and drives including the anti-friction, 4speed, V-belt Lever-operated pedestal base motor drive illustrated. Telescopic Taper Attachment and other accessories available.

For Production

♦ Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ballor Super-Precision, Roller spindle bearings. Lever-operated Collet Attachment, Lever-operated Tail Stock, Lever-operated cross slide with double tool post, Leveroperated turret, etc.

For Machine Shop

● Both Bench and floor models with choice of Semi-quick or Full-quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed. Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling attachments and all standard accesories.

Write for Catalog and name of your local distributor.

SHELDON MACHINE CO., INC.

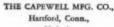
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FORGE SHOP Improves Cutting 50%

PEORE this Mid-Western forging concern swung to Capewell's TECHNITE power blades, they ran a test, Results showed Capewell "cutting 50% better" than the blades previously used. Again Capewell sets a new record. Another piece of testimony backs up our statement that Capewell precision-cutting hack saw blades cut cours—because their breakage is smaller, because their swing is faster. In addition, the accurate, precision cutting by these blades saves you vital man and machine hours on subsequent operations. Have you tested Capewell? You had better speak to your mill supply man today.



U. S. A.

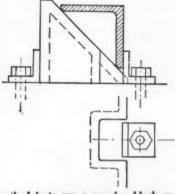
CAPEWELL



Drilling Steel Angles

By Paul Grodzinski

The illustration shows a simple cast block and two clamps of small steelangles, to hold one flarge of steel angles exactly horizontal when drilling holders under a drill press. The usual



method is to use a wooden block underneath, but no accurate support is provided, and the weight of the block has to be adapted to the length of flanges. The fixture illustrated can be adapted for every steel-angle of equal flange length in a wide range and its length can be so chosen as to correspond to the length of the bar. Usually only two to three clamps have to be provided on each side.

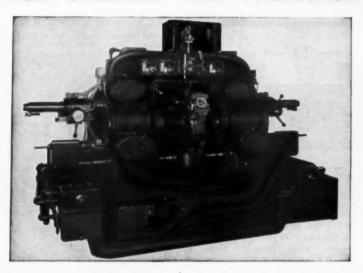
Details of Bearing Design

First of a new series of booklets to be distributed under the generic title of "New Departure Engineering Service," and now immediately available is:—"Details of Design of shafts and housings for ball bearings."

Written for the benefit of the machine designer interested in applying ball bearings, this very helpful volume includes such subjects as proportions and finish of bearing seats; locknut threads, recommended shaft shoulders; designing to aid disassembly; locating and clamping methods and the use of adapter sleeves.

The section on Housing treats of

Designed FOR SPEEDING WAR PRODUCTION



DESIGNERS AND BUILDERS OF STANDARD AND SPECIAL MACHINE TOOLS PRECISION GAGES JIGS AND FIXTURES

20 years experience

THIS automatic indexing machine has been developed for precision boring, turning and milling of bomb parts and similar products. Illustration shows valve body in production. Minor engineering changes permit easy conversion from one product to another. Operation is hydraulic—control electric.

Send for information about application of this or similar machines to your production.

THE SOMMER

AND ADAMS COMPANY

A BIG VISE FOR YOUR BIG JOBS



...and Precision, too!

It's new—larger—heavier—accurate! Designed and built to fill the need for precision on the big vise jobs. Note the heavy jaws, longer ways, broad base and extra swivel bearing surface of this Rousselle Victory Vise. Once swivel is set, it stays put! Built to cut set-up time in half—made in three sizes: 7 in., 10 in. and 13 in. Made by the manufacturer of Rousselle punch presses.

Write for Bulletin MT62 and prices,

Preference rating certificate must accompany orders.

Distributors: A few select territories still available.

DAVID J. ROSS CO.

bearing corner radii; recommended housing shoulders; straight through and shouldered housings; snap ring bearings and the use of separate snap rings; bearing housing covers; adapters in the housing; use of split housings; clamping and spacing details.

Each subject is profusely illustrated with well executed line drawings.

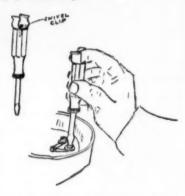
This booklet furnished gratis to engineers and designers who address Advertising Dept., New Departure, Bristol, Conn., specifying Booklet "DD."

Swivel Clip Screw Driver

By Chas. H. Willey

This little idea which dawned on me after much lost effort in the handling of small screws in assembly work of small instrument parts has proved a valuable time and labor saver.

Some who see it will immediately say, well a jeweler's screw driver is hollowed at the top and has a swivel top. That may be, but for real security and quick handling, I prefer this finger grip swivel clip.



All the working fingers are free to turn the screw in or out and no effort is required to grasp the screw driver to keep it in place. Once used, the reaction is—"why didn't I think of it before." The clip is made of spring steel and secured to the end of the handle on a pivot screw.



FACOWING

GRINDING. PROTECTS UST CONTROL SYSTEMS





Standard Type D Roto-Clone combined exhauster and dust separator. Write for engin-cering data and Bulletin No. 272.



The Airmst Dust Arrester is designed for the collection of fibrous and flaky dusts.
Available in all sizes to meet any air volume requirement. Bulletin No. 280.

Thirty-three AAF dust control installations protect grinding, buffing and polishing operations in the Lycoming motors plant. Equipment installed includes Roto-Clone Standard Type Dunits for belt polishers and grinders in the tool room, Self-Contained Roto-Clones with after cleaners serving Kellerflex grinders throughout the assembly floor, and Airmat Dust Arresters serving buffing operations for finishing connecting rods, master rods, crank shafts, cylinder heads and propeller hubs. There's an AAF product designed for every dust control need. Write for descriptive bulletins.

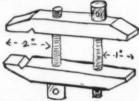
TITER COMPANY, INC., 312 CENTRAL AVE. TOUISVILLE, by.

CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

Short and Long Jaw Clamp

By Chas. H. Willey

By making up a set of parallel clamps, designed as shown, the range of usefulness is increased considerably, for one has practically a pair in one clamp.



Making the long jaw with a vee increases its usefulness on round work. Dimensions for depth of jaws can be to suit the needs.

Eliminates Several

Hobbing and Hand Operations

An internal gear had to be cut in the bottom of a cavity in a block of steel. After the preliminary machining op-



A COMPLETE LINE TO FILL EVERY DIE MAKING SPECIFICATION

DANLY MACHINE SPECIALTIES, INC. DANLY MAGNINE SPECIALIES, NG. 2122 South Sind Avenue, Chicago, Illinois Milwaukee, Wis.; Long Island City, N. Y.; Dayton, Ohio; Philadelphia, Pa. Claveland, Ohio; Philadelphia, Pa. DUCOMMUN METALS A SUPPLY COMPANY

Los Angelos, Cal.; San Francisco, Cal.

PRECISION DIE SETS AND DIE

erations had been performed, the block chucked on a dividing head mounted on the table of a milling machine upon which a "Slotmaster" was installed. This detachable slotting head can be attached in a few minutes to round overarm and other milling machines, permitting their use as vertical slotters and shapers. A special form tool and tool holder was inserted in the clapper-box of the "Slotmaster" which can be turned in any position desired. With this set-up the job was done quickly, cleanly and accurately eliminating several costly hobbing and hand operations.

Photo—Courtesy Experimental Tool & Die Co., 12607 Greiner, Detroit, Mich.





Artus Spacers

Made of Synthetic Resin in thicknesses from .oor" -.020". Each thickness can be identified by its color.

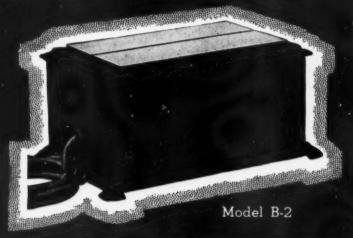
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Industrial Products Suppliers. 2 Broadway. **New York City**

W DEMAGNETIZERS

Engineered for quick removal of magnetism from work. Model B-2 is for large jobs and Model J-1 for small work. A single pass over the stationary poles demagnetizes the work completely.



Also Mfr's of

DIVIDING HEADS
LATHE CHUCKS
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MAGNETIC CHUCKS
MILLING MACHINE
VISES

Model B-2 working surface 7¾" x12"x6¾" ----- \$63.20

Both Demagnetizers equipped with pilot light signal controls. Operates on 110 volt AC current.

L-W CHUCK CO.

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CHICA GO

Speed and Smoothness in uting action longer Life that's what you get when you use Chicago Mounted Thusle.

Made in all types of abrasive, grains and grades, mounted on shanks of efferent diameters and lengths—there is a Chicago Mounted Wheel to lick every or ading job from the most intricate care age dies to spagging hard-to-reach parts on lanks. For high-speed POLISHING, the sensational new Chicago Soft Rubber Mounted Wheels save hours of tedious has a work.

Illustrated is a group of wheels wounted on W diameter chanks, for use with portable and precision equipment. These are one-half actual size. Hundreds of other shapes are available on 1/20, 1/2 and 1/40 diameter mandrols.

TRY ONE—That's the quick way to learn first-hand about these remarkable wheels. Tell us the bind of job, size and wheel speed you use and we'll send a test wheel postpaid.



No. A-1

* No. A-2

No. A-3

* No. A-8

TOOLS OF THE HOUR



The 3-pound grinder was perfect balance—
a real he-man products, tool that is saving
hundreds of hours in on national war offer.
Ample power to drive 214 dia wheels
17,000 r.p.m. Encased with 3 microso Mounted
Wheels, Drum Sander and Band Wrenches, Dressing Stone, \$38.50.

TOOL OF 1001 USES

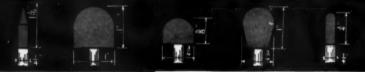
First and finest. Wt. 12 oz. Uses 300 accessories to grind, drill, polish, cut, rout, carve, sand, saw, sharpen, engrave. Plugs in AC or DC socket. 25,000 r.p.m. \$18.50 with 7 accessories.





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* No. A-14



* No. A-22

* No. A-23 No. A-24



26

No. A-31

No. A-32

* No. A-33



No. A-36

No. A-37

* No. A-38

No. A-35 * This shape also available in Soft Rubber Polishing Bond.

CATALOG-Covers the complete line of Chicago Mounted Wheels and time-saving accessories for use with portable tools. Send for copy today.

Dept. HB Chicago, III. Address

CO. | Send Hi-Power | DeLuxe Handee





For Drill Presses, Radials, Shapers, Planers, Automatics, Boring Mills, Millers, Lathes, Turret Lathes, Tappers, Gear Cutters and other Standard or Special Machines.

Many of your older machines are a priceless asset today when new machine tools are hard to get. And their production capacity is probably well over their best past record, too. Have you considered making them more efficient with a new, individual motor drive? In hundreds of plants today older machine tools equipped with Drive-All motorizing units are making new records. Available promptly, installed quickly, 1 to 10 h. p. with 3-speed or 4-speed gear box.

Write for literature and name of local representative.

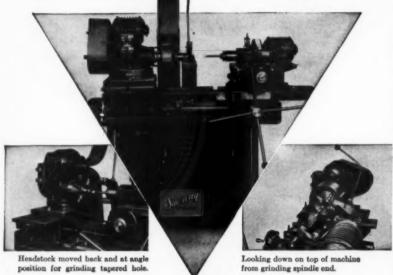
DRIVE-ALL MANUFACTURING COMPANY

THESE gages are outst ence. They are positive, in use. Experience has privace tive, accurate, entirely from excess friction and E — is sensi-ichanical, free f motion. GRINDING GAGE - definitely saves time. money and material. CALIPER GAGE - has hundreds of applications. GUN BORE GAGE — checks both "lands" and grooves without costly extras. Fast, accurate, and entirely me-chanical. What have you to inspect? FEDERAL PRODUCTS CORPORATION Providence, Rhode Island SHELLS GUN BORE All Sizes and Lengths FEDERA

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Sav-way Multi-Purpose INTERNAL GRINDER



Offers greater flexibility . . . a

precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6"... grinds holes ¼" to 18" in diameter... holes up to 9" deep, straight or tapered... entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts... worm compensating device permits grinding wheel head adjustment to .0001... sturdy construction throughout... full specifications, delivery time and price on request.

134 Distributors in U.S. and Canada to serve you.



"Tooling Up" for

Majoria

Norwood Hydromatic Lathe

A NEW Norwood Hydromatic Lathe, a multiple tooled, fully hydraulic, automatic lathe for turning shells, is offered by The Norwood Engineering Co., 94 No. Maple St., Florence, Mass.

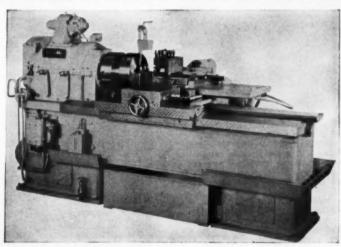
Four standard models are available for the different operations in turning shells from 50 mm to 155 mm. Model ST-1, which is for centering and cutting off the shells, has a carriage surmounted by a rest on which are solidly mounted a motor and center drill.

Model ST-2 is for rough turning. It has a heavy duty tailstock of close-grain cast iron, and the revolving spindle is of high-carbon steel, ground, with a No. 5 Morse center. In addition to the carriage is a cross slide at

front equipped with 3 tool holders for roughing tools and a unique arrangement for a boattail tool. A back tool slide is equipped with one tool holder for the back facing tool.

Model ST-3 takes care of boring the nose and rough facing, rough reaming, finish reaming and facing. Surmounted on the carriage is a hexagonal turret with all faces bored and tapped for mounting tool holders. The turret is easily indexed manually and the indexing is always positive.

Model ST-5 is for cutting off and finishing the base of the shell, and for cutting the band groove. This model has a carriage in a fixed position on which is mounted a cross slide with one tool holder, and a back bracket



mounting a back tool slide with 2 tool holders.

Other modern features include:—The Barnes Patented System of Hydraulic Transmission and Control; the Bijur Oiling System; driving through a Link-Belt silent chain from motor to back gear shaft; interlocking of main drive motor with the hydraulic feed mechanisms; hydraulically controlled feeds with infinite variation; a rugged headstock with a carefully worked out gear arrangement; Timken radial thrust roller bearings; and an extra heavy bed and pedestals. The lathes have 8 ft. and 10 ft. beds.

Hydraulic Forming and Flanging Press



An Hydraulic Forming and Flanging Press has been introduced recently by the Beatty Machine & Mfg. Co., Hammond, Ind. It is available in capacities up to 400-tons and features a new selfcooling hydraulic oil system which is said to eliminate the need for cooling coils.

The hydraulic oil circuit is so arranged that the 2 vertical cylinders, each having a 200 ton capacity, can be tied together and operated as a single 400 ton press with operation by one level control.

When used for flanging, the front cylinder advances to the work on down-stroke at rate of 290" per min. and holds work under pressure while horizontal ram advances at same rate. Under a full load, this ram presses at the rate of 21" per min.

the rate of 21" per min.

Further specifications for the 400ton model illustrated are: maximum
daylight of press 45"; stroke of cylinders 24" depth of throat 66" from center of vertical cylinders to housings.
The lower platen is 48" right to left;
88" front to back. These figures naturally vary with size of machine and
can be changed to adapt machine to
the particular requirements of a job.

Bliss Hydraulic Heading Press

250 to 300 cases per hour are said to be obtainable with 2 pressings per case on this 1,500 ton Bliss hydraulic heading press, used for heading 105 mm howitzer cases. Press is equipped with 2 station pneumatically operated dial feed, 2 station punch holder operated pneumatically, a hydraulic ejector driven by a 7½ hp motor and a hand operated air hoist. The main pumping unit is of 75 hp capacity.





MOLYBDENUM ENLISTS FOR THE DURATION

The enormous increase in requirements of molybdenum has necessitated the War Production Board Order M-110, placing molybdenum consumption under allocation control.

Our metallurgical research staff is fully engaged in war work. At our mine, mill and converting plant, every effort is being made towards maximum production.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED-FERROMOLYBDENUM-"CALCIUM MOLYBDATE"

Clima: Ty On Im Tompany
500 Fig. 1 to York City

Press is arranged with a fully automatic cycle. When a case is placed in forward station, pressing the start button causes dial to rotate, bringing out the previously pressed case and placing new case under press. When the dial is in its new position, press closes rapidly, changing speed before contacting work, and exerting a given pre-determined pressure, automatically reversing and returning to starting position. The reciprocating punch holder then operates to bring second punch into position automatically and then a second pressing cycle with another independent pressure is accomplished. Meanwhile, ejector rises and ejects finished case in forward station during the first pressing, allowing operator to pick case off with the air hoist. During second pressing, ejector returns to starting position, allowing operator to put in a new case.

Entire cycle is fully protected against mis-operation. Press cannot descend unless dial and punch holder are in

proper pressing position. Dial and punch holder cannot operate unless press is in upward position. Another added safeguard is a device which automatically prevents slide from de-scending if no work is in press.

For die setting operation the several functions of press cycle are separated by means of a selector switch so that press movement, dial movement, ejector movement and punch holder movement can be independently operated by proper push buttons. The same safeguards against mis-operation and the same interlocks for safety are provided when on hand control the same as when on production control.

This press is one of several sizes available for heading different sizes of cartridge cases. Hydraulic presses are available for this work from 600 to 3300 tons.

For further information address E. W. Bliss Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.

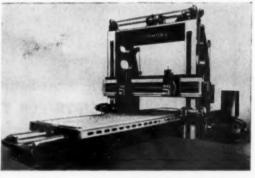
Simmons Heavy Duty Planer

A new 120x96" heavy duty planer has been announced by Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. Among its special features are forced feed lubrication to the ways, herringbone gear drive for smooth flow of power, rapid traverse to all heads, double length enclosed bed, and double plate box table.

Width between housings is 124"; height under bridge, 1101/2" and under cross-rail, 971/2". Width

of table is 96". Motor is 50 hp, and has speed of 150-900 rpm. Cutting speed of table is 19-115 fpm. It comes in 4 lengths of table, 21'8", 25'8", 31'8", and 35'8". Corresponding lengths of bed are 43'11", 51'11", 63'11" and 71'11". Universal Slotmaster

New edition of 4-page catalog concerning the Universal Slotmaster reveals but few revisions. After a year



of use in the shops of the country, this attachment for milling machines has hardly been changed. Provision has been made for more convenient adjustment of the length of stroke. The bearing design has been revised to compensate for the slightest wear, which facilitates maintenance. The tool is made by Experimental Tool & Die Co., 12607 Greiner. Detroit, Mich.

COMBINE Speed WITH Precision IN TAPPING

THE new Bakewell Radial Tapping Machine, with its patented lead screw control, offers precision performance that taps Class 3 and 4 gauge fits in any material from plastics to alloy steels ... It's precision that eliminates costly rejects—saves more costly delays.

And speed? You gain it by bringing the tap around the work, instead of the work around the tap—from the hydraulic elevating ram, the rigid yet flexible radial arm, the free floating tapping head... These and other exclusive features assure a combination of speed and precision

that will help you meet war production schedules ahead of time.

Also made in rigid spindle types No. 1 and 2. Capacities: 4-40 to 2 inches in steel.

Send for catalog

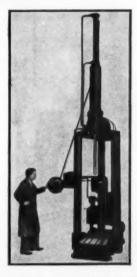
Bakewell MANUFACTURING COMPANY
2427 EAST FOURTEENTH ST. * LOS ANGELES, CALIF.



BRIDGEPORT, CONNECTICUT

Hi-Speed Honing and Lapping Machine

Internal cylindrical surfaces with bores up to 24" in diameter and with any stroke from 20 up to 72" can be honed accurately, quickly and economically on Hi-Speed Honing and Lapping Machine manufactured by the Automotive Maintenance Machinery Co., 2106 Commonwealth Ave., North Chicago, Ill.



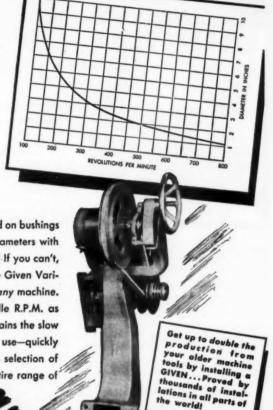
The machine is rugged, versatile and flexible. It is designed to permit rapid honing of a wide range of work. Ideal for straight line lapping or co-directional honing, it removes high spots, out-of-roundness and taper, and produces a round straight bore.

Design provides ample space for large cylinders to be placed on standard base. Variations in stroke or height under the spindle nose are easily taken.

All controls are located at front, at operator's station. Any stroke setting, withdrawal of hone from the cylinder, short stroking at any point, changes in

How many S. F. P. M. for Bronze?

Carbide Cutters machine bronze efficiently at 250 surface feet per minute. But-can you get this cutting speed on bushings and other small work diameters with your present equipment? If you can't, Given can help you! The Given Vari-Speed Drive mounts on any machine. It raises available spindle R.P.M. as much as 30%, yet maintains the slow speeds too, It's handy to use-quickly installed, and it enables selection of any speed within the entire range of the tool.



the world!

I-SPEED DRIVE

GIVEN MACHINERY COMPANY . 3857 SANTA FE AVENUE . LOS ANGELES, CALIF.

[&]quot;Surface feet per minute.

BALDOR BEARING GRINDERS

STURDY BUILT

for Long, Hard Service





ASK FOR BULLETINS

ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder, ½ h.p. ball-bearing motor, 6° Silicon Carbide wheels; \$95.00 Ask for Bulletin 305.

At left: BALDOR Grinder No. 101; 1½ h. p. ball-bearing motor; 1725 r.p.m., 220 voits, 3-phase; 10^a Aloxite wheels;

Ask for Bulletin 307.

\$90.00

BALDOR ELECTRIC COMPANY 4368 Duncan Ave., St. Louis, Mo.

speed of reciprocation or rotation of the spindle, can be had from front of the machine regardless of stroke capacity.

Positive stop and dwell system makes it possible to stop spindle at bottom of each stroke or at any point within the stroke range without shock to machine or work being honed, and holding the spindle at that point up to 1½ minutes. It is especially useful for "blind hole" honing.

Machines are made in 4 sizes, any of which can be had with strokes up to

Overcoming Weld Spatter

A new product, Acme Quality Industrial Finish Flash-Off No. 99, is said to eliminate weld spatters and the time cost of removing them, plus giving a stronger, smoother weld.

The mechanic simply brushes, sprays, or wipes on Flash-Off along the edges of the metal surfaces to be joined by the weld. Then when welding is done, metal particles are said to bounce or fall off instead of adhering to areas

adjacent to the seam. This eliminates grinding or scratching these chips off. The seam is asserted to be smootherand also stronger because impurities are removed from the welds, and, being an excellent conductor of electricity, Flash-Off helps prevent the weld are from breaking.

It is claimed to prevent pitting on galvanized or ungalvanized metal surfaces and permits immediate application of paint without cleaning operations other than wiping off.

The new product will be marketed in 55-gallon drums and 5-gallon cans. Address Acme White Lead & Color Works, Detroit, Mich., Dept., FS-19.

Atkins Bulletin

A new 32 page Guide to Metal Cutting Efficiency has been issued by E. C. Atkins & Co., 448 S. Illinois St. Indianapolis, Ind. Descriptions are given of the Atkins curled-chip system of metal cutting. Illustrations and tables are given showing the correct type of blade to use on different jobs.



Now cutting-off operations can be performed efficiently with inexperienced help... because of the many advantages of

EMPIRE TOOL COMPANY'S LUERS CUTTING-OFF BLADES

Put the skilled men where they are needed most—on jobs that can be done only by men with specialized training. No need to put these men on grinding cutting-off blades when their particular experience is so essential on other work.

Once set for a specific job, Luers Patented Cutting-Off Blades require very little attention during operations. When resharpening is necessary, any workman can remove the blade, grind its face only, and replace it accurately in its former position.

The blade is securely locked in a tool holder and is held just as rigidly as any forced tool could be held. When resharpening is needed, only the blade is removed: the set-up of the holder never changes. Replacement of the blade after resharpening is accomplished very simply with special gauge.

Pariodic regrinds never destroy the side and back clearances, for they extend the full length of the blade. Thus the blade retains its extraordinary efficiency until it is reduced to within an inch of its length, when it is too short to be held securely in the holder.

Aside from these advantages, the outstanding value of

the Luers Patented Cutting-Off Blade lies in the fact that excessive friction is eliminated and the usual troubles of breakdowns are materially reduced. The absence of excessive friction is brought about through the distinctive design of the blade in presenting a minimum amount of tool surface into the cut.

If you will specify the kind of equipment you use, we will recommend the proper blade and holder and let you experience in your own plant the many advantages possessed by this remarkable blade.



- A The T-shape pravides ample side clearance. Only front face is sharpened.
- B Tapered blodes, recommended for deep cuts, hove back and side clearances full length of blode.
- C Hollow-ground top of blade curves chip to relieve friction against sidewall of cut.

ides, both topored and parallel on the lang linal culting width, carried in stock.

Produced under license issued by John Milton Luers Potents, Inc.

The Blades that reduce friction

EMPIRE 7 out Co.

5782 Grinnell Ave. Detroit, Mich.

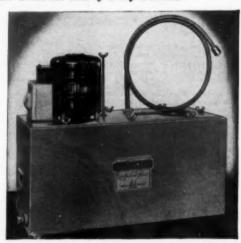


Portable Coolant Units for Heavy Duty Service

Three larger capacity portable coolant units for automatic applications of coolants to cutting tools are announced by Gray-Mills Co., 213 W. Ontario St., Chicago. The new models designated as Heavy Duty, "A" series pumps (G-2A, G-3A and G-4A) like the original "G" series, are designed to prolong tool life, speed up production and lower operating costs.

Features stressed clude:-complete portability; controlled flow from a few drops to full stream; baffle construction plate and forced settling fixture keep coolant fluids to clean: larger tank capacity (10 and 121/2 gal.) to eliminate frequent changes; ball

bearing type motors; easi-ly replaced hardened driving gears;



pling and easy access to all working cleanout plug; flexible power shaft cou- parts. On machine set-ups requiring

Checked and Rechecked



The Industrial Pentro Penetrator

For use with Rockwell and other hardness testing machine. Unique design and precision manufacture insure perfect, consistent readings.

PERFECT CALIBRATION

The Standard of Accuracy for a Decade

The diamonds for Industrial Pentro Penetrators are selected for density and hardness from the finest grade stones, and lapped to the correct form. Research has proved that the use of a pyramidical shape diamond assures absolute accuracy in testing the hardness of metals. Such a point is also much longer lived.

The Industrial Pentro Penetrator has a number of sides formed to the correct angles so that, when a test is being made, all sides come into play at a minute depth.

Write for Catalog

Full information on Pentro Penetrator and complete lines of Diamond Wheel Dressing Tools.

INDUSTRIAL DIAMOND CO.

7 Avalon Avenue,

Detroit, Michigan





Engineering Company

Frankenmuth, Mich.

4 to 6 points of coolant application, each has its own coolant flow regulator.

Standard machine working tables may be adapted to coolant pump use with especially designed "Flo - Bac" pans. "Flo-Bac" fittings consisting of lead-off pipes, fittings, clamps flo-con-trol valves and flexible tubing permit permanent and easy attachment to single and multiple spindle drill presses.

Complete descriptive literature containing specifications, sizes, capacities, the new heavy duty "A" series and electrical characteristics and prices on the original "G" series pumps and "Flo-Bac" pans and fittings is available.

Welding Costs
In a recent speech, James F. Lincoln, president of the Lincoln Electric Co., mentioned that the cost of a 200 ampere welder had decreased from \$1550 in 1915 to \$200 in 1942. During that time the capacity of the welder has been increased by 20%.

Also in that time the average wage of the workmen has increased from 21c The number of to \$1.80 per hour. man-hours of direct labor to produce this machine has decreased from 131 to 20.6 hours.

Another example he cited of reduced costs was that of an electrode which was decreased from 20 to 4.8c per pound since 1929. Direct labor has decreased from 71 hours to 3.6 hours per ton, and wage per man hour has increased 51c to \$1.80 per hour during the same period.

Metallurgy Book

A 262 page book "Metallurgy" has just been published by American Technical Society, 58th at Drexel, Chicago. The price is \$2.50. The chapters include:—properties of metals and tests to determine their uses, chemical metallurgy, producing iron and steel, physical metallurgy, shaping and forming metals, some commercially important nonferrous alloys, light metals and alloys, copper and its alloys, steel-man's servant, heat treatments for steel, surface treatments, alloy or special steels, classification of steels, powder metal-

45 Billion

GEAR TOOTH CONTACTS

.. without measurable wear

A prominent manufacturer added "dag" colloidal graphite to his grease for a test involving 1500 hours of running time and 500,000 gear tooth contacts per minute. No measurable wear was detected · · · Subsequent performance of the test grease without "Oildag" (colloidal graphite in oil) was unsatisfactory · · · Send for comprehensive report by their test engineer and bulletin No. 220H

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

"Dag" and "Oildag" are registered trade-marks of A. C. C.



The electric-furnace graphite used in "dag" products is made in U. S. A.

Down Draft Dust Control System

A recent Kirk & Blum development is the down draft system of dust control. Dust is carried off thru ducts constructed under the floor, which saves floor space and does not obstruct working areas. Bench - high gratings, thru which air is exhausted, enable operators to handle castings conveniently for sanding, snagging, grinding, polishing and buffing.

The down draft dust control system is claimed to be a decided advantage in finishing

departments of the machine tool industry. It is possible to grind and sand castings within a few feet of precision machinery without the necessity of partitions or curtains.

All dust particles are carried down thru the gratings as fast as they are released. These surface gratings and under-the-floor ducts help maintain a clear atmosphere. Further information and catalog is available from The Kirk & Blum Mfg. Co., 2804 Spring Grove Ave., Cincinnati, Ohio.

Scrap Metal Conservation

Enough metal — 350,000 pounds — to build more than nine 18-ton army tanks has been collected in an intensive scrap conservation campaign at the East Springfield Westinghouse Plant.

Conducted in addition to the plant's



year-round scrap program, a "Collect Our Scrap and Build a Tank" drive sent workmen searching thru their work benches, tool chests and on factory floors for all excess materials not necessary for war production.

Old dies, tools and fixtures, which a survey revealed could not be used in the war program, were sent to mills for re-processing.

These articles were deposited each day in large containers located at all factory gates.

Directors of the drive said they would be on a permanent lookout for metals that might be used in the war program. A continuous review of all tools and fixtures is planned to determine which are of immediate value and which should be scrapped.

Shaper Vise with graduated Square Swivel Base

The base is graduated and has tongue in center to fit slot in table, also has holes for bolting down.

Size Net Price
No. 4_6* jaws, 1½* deep, opens 5*
Pressure between jaws, with handle farnished 2400 lb.
Net Weight 45 lbs.

E. Plunket Machine Co. 1823 W. Lake Street, Chicago, Illinois

U.S. Multi

deliver Plus Performance in War Production

IHIS is one machine tool which efficiently performs a number of operations on comparatively small parts and consequently can be applied to great advantage in war production. Its cam controlled action makes it an extremely versatile and time saving tool. The table feed cam illustrated - detail at the right - is the basis for close accuracy, especially in taking blind cuts . . . for short set-up time without guess-work . . . for a fast approach, a cut at the most appropriate predetermined speed, and a fast return ... for conserving skilled labor, as the automatic table eyele enables one operator to handle a full battery of these machines. A cam applied to the vertical motion of the spindle head can easily be synchronized with the table feed cam for two-level milling, angle cuts, contour cuts, etc. A few of U. S. Tool Cam-advantages are pictured in detail-all enhance the performances of the U. S. MULTI - MILLER which include index milling, speed grinding, vertical milling, spur gear cutting, hand milling, automatic cut off, continuous milling of bar or coil stock, climb milling, rotary milling, contour milling-all are "Plus Performance" features, ideal for War Production. Revised Bulletin lists all U.S. MULTI-MILLER advantages; send for your copy today.





U.S. TOOL COMPANY, Inc.

AMPERE (East Orange), N. J.





Standard Cam provides cycles of fast table approach, cuts at desired speeds and a fast return. Top view illustrates special double cam for positive return stroke of table. Table traverse is always smooth-actioned. No backlash, ever! Center view illustrates application of special hinged fasture which, in conjunction with cam-operated feeds, mills intricate contours at high speeds, with absolute accuracy and smoothness.







Portman Rotary Surface Grinder

A new Rotary Type Surface Grinder with several advanced design features is offered by Portman Machine Tool Co., Mount Vernon, N. Y.



Of rugged construction, it is amply powered to remove stock fast and to exacting requirements. This machine is of unit type construction consisting of a heavy box type base containing the entire coolant system, rugged well proportioned motor head column, roller mounted column subbase, and fixed magnetic rotary chuck drive assembly which is incorporated directly into base.

The main drive comprises a totally enclosed 7½ hp motor with which the entire precision spindle head is integrally mounted. This spindle head drive provides high torque for the 8" cup type grinding wheels used. Spindle assembly is carried on over-sized precision type pre-loaded bearings. The entire motor head and column assembly is adjustable for grinding concave and convex as well as flat surfaces.

The magnetic chuck drive furnishes 5 speeds for all classes of work and is

HILCO No. 2 Universal

The HILCO Tool Grinder is a precision machine with the same range, accuracy and workmanship heretofore found only in Grinders costing from three to five times as much.

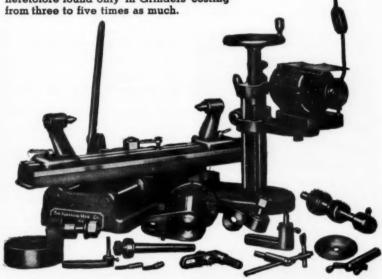


Illustration shows the complete grinder. Centers are adjustable to 14½"; handling cutters 6" in diameter, 9" length; universal attachment, vertically, grinds saws and cutters to 18" diameter. Tapered sleeve spindle furnished in No. 9 B&S, Morse taper with arbor and step collars. Motor is universal, 110 volts; 220 or special voltage motors can be furnished.

Price-\$395.00. Send for special bulletin showing how the HILCO simplifies tool and cutter grinding.

HILCO CORPORATION

429 W. SUPERIOR ST. CHICAGO, ILL.

PRECISION PRODUCTION TOOLS

Angle Plates-Mechanite Metal Air Guns—(Leakproof)
Boring Heads—Boring Tools
Box Parallels Ball & Roller Bearing Live Centers Demagnetizers Cutting Tools
Dust Collectors Electric Etchers Profiling Machines Magne-Blocks

Flexible Shaft Machines athe Chucks Lathe Chucks Vises-Precision Bench & Machine V-Blocks Reciprocating Tools Universal Tool Holder Magnetic Chucks Parallels Surface Plates-Mechanite Metal Straight Edges-Mechanite Metal Taps-Special

ACME TOOL COMPANY 200 CHURCH STREET NEW YORK CITY



Abart OUALITY-No Extra Cost

For Precision Instruments, Machine Tools, For Precision Instruments, Machine Tools, and Larger Machinesy.

ABART Gears last longer-mean fewer replacements—add to PROFITS by reducing maintenance. SERVICE and MONEY-SAV-ING that "mesh" perfectly.

No stocks. Made only to your requirements. Send specifications for estimate.

ABART SPEED REDUCERS—Many types and sizes in stock. Write for Catalog.



driven by a separate motor. magnetic chuck provides capacity for grinding parts as large as 14" in diameter and 9" high under a new wheel. The motor coolant pump is of the unit type, providing a large volume of coolant directly to work and grinding wheel. Floor area required is approxi-mately 3x7' and height is 5'9". Standard equipment includes two cup type grinding wheels, all motors, magnetic chuck, demagnetizing switch, motor controls, complete coolant system, splash guards and completely wired for operation.

Armstrong Tool Holder Catalog

Catalog C-39 has been issued by Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago. It describes their line of tool holders for lathes, plan-ers, slotters, and shapers; turret lathe and screw machine tools; bits, blades, cutters, and high speed steel; machine shop specialties; lathe and milling machine dogs; clamps; ratchet drills and drilling posts; open and socket wrenches; and pipe tools.

MACHINING OF SPECIAL FITTINGS

Most of your machining such as Drilling and Tapping operations are more easily done and at less tooling costs.

with JOHN'S DRILL JIGS

HEUSER MFG. CO. 1638 N. PAULINA ST., CHICAGO, ILL.





New facilities and expansion of output makes reasonable deliveries possible now to essential war plants on these vital inspection devices.

Write or wire for details

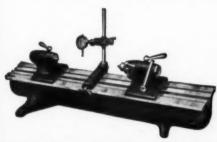
THE AMERICAN GAUGE CO.
125 Bayard St. Dayton, Ohio

Designers and Builders of Tools, Dies, Gauges and Checking Devices since 1919



AMERICAN THREAD CHECKER

Recommended and used by leading manufacturers of thread grinding equipment for accurately checking threads on pitch line to one ten-thousandths. Capacity up to 5 in. diameters.



AMERICAN BENCH CENTER

Improved design. Three sizes; 4*x10*; 6*x24* and 8*x36*. Inclined bed to better facilitate removal of work. Box type construction, precision scraped. Ruggedly built for either inspection or production work.

UNIVERSAL RADIUS DRESSER



Dresses surface grinding wheels to either convex or concave radii to quarter-tenth accuracy. Will improve the radii on your gauges, grinding formers, form tools, punches, and dies.



"We Can Cut 25% Off That Job! with this Colwell Turret"

More and more shops are cutting production time with our four tool post turrets. And in many cases the time saved has more than paid for a turret lathe.

Easy to install—Quickly and accurately indexed—Carries 4 tools—positive locking—has cutting off tool.

Order a turret now and have it ready for your next multiple tool job. Send for new folder.

S. G. Colwell

25 Congress Ave. Prov. R. I.

Doall Operator's Guide Book

A new guide book for Doall operators entitled "A Chalk Talk on 40 Different Ways to Cut Machining Costs" is now available from Continental Machines, Inc., 1300 S. Washington Ave., Minneapolis, Minn.

It has been written especially for the thousands of machinists who are called upon to operate the Doall Contour Sawing Machines, even the they have had little or no training in contour machining.

Pocket size, the book contains 48 pages of illustrations, showing ways in which experienced operators have saved time and metal in machining practices. A number of these ideas were formulated as a result of experience gained at Doall Trade School. In the training of hundreds of operators, instructors found numerous short-cuts which contribute, not only to the ease of operation, but also to greater speed and accuracy on sawing and filing jobs.

Each illustration is a "chalk talk" explanation concerning such operations:—how to stack parts in making stampings without dies, welding the saw band, how to grind and readjust saw guide inserts, use of mirrors in filing operations, easy-to-make fixtures for sawing shells, tube cutting, etc.

For production jobs where speed and accuracy is of prime importance, a number of attachments are shown. Operators are shown how to operate such attachments when:—they are required to cut true circles such as disc or rings, squaring or beveling small parts, how to miter, rip or do cutting of operations on one attachment, how to use a saw lubricator in cutting tough material, and the use of an etching pencil for marking parts finished on the machine.

Stickers — Labels

A booklet describing the uses of the new-type sticker and label has been issued by Avery Adhesives, 451 E. 3rd St., Los Angeles, Calif. It covers in detail various applications of the product in war production and as substitutes for metal tags.

Efficiency

Boosting B-1 duction isn't s 1 ply a matter enthusiasm. A part of the 1 ; is using tools, nachines, and manpower as efficiently as possible. All individuals and groups must undertake a critical examination of their war efforts.

Every plant can do more to increase its machine and tool utilization. And every plant must do so,

Inclinable

Adjustment

Hitler won't wait for us to build all the new tools we need, so in many cases we must use what we already have.

Close attention should be given to such problems as:

- Taking proper care of tools.
- er care of tools.

 2. Prevent-
- ing breakdowns.
 3. Cutting down accidents.
- 4. Good light-ing.
 - 5. Maintenance and repair.
- Adapting old machines to new uses.
 - 7. Cutting wastage.
 - 8. Breaking production bottlenecks.
- 9. Using every machine to the fullest practical extent.

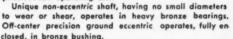
These are just suggestions, and you will probably have to adopt them in your own plant. Management wants to increase war production, and workers want to help in this end also. Many plants in this country can get more

High Speed Punches



RUGGED PRECISION CONSTRUCTION

Incorporating many exclusive features to assure precision operation and long trouble-free life Duro One and Four Ton Presses are of extra-rugged construction. Low first price... Low operating cost.



Send today for illustrated file-size catalog on Duro Punch Presses, Vertical Milling Machines and Accessories.



DURO MACHINE TOOLS

PUNCH PRESSES—MILLING MACHINES—ACCESSORIES Duro Manufacturing Company • 800 E. 61st Street • Los Angeles, California

out of their existing machines.

Therefore it is imperative that both labor and management tackle the problem seriously and do everything possible to help bring about more efficient and faster production.

The Government will make available, upon request only, further general ideas and suggestions for fuller utilization of existing tools and machines. It must be realized that applications vary in every plant.—From a recent War Production bulletin.

MORTON

HEAVY DUTY * * *



MORTON RATCHET TOOL HOLDER

Speeds up production
Saves you set ups
Gives longer service
Compensates for wear in
hard use
Extremely accurate.

WRITE FOR DETAILS ON THESE AND OTHER MORTON PRODUCTS

3225 HARNEY ST.

BENCH TYPE DRILL PRESS

Listed below are some of the many outstanding features of this machine. Precision 6 Splined Spindle, 4 Ball bearings that will last the life of the machine. Well guarded Spindle, does not project through the pulley. Spindle easily changed. Spindle return housing. Easy head and table adjustment. Sturdy construction throughout. Designed to last and give satisfactory service.

Prices and Specifications sent on request.

OMAHA, NEBR.



New Insulating Varnish

MORTON AIRCRAFT CORP

Especially developed to meet coil insulation requirements of generators, a new insulating varnish capable of withstanding high temperatures is announced by Westinghouse Electric & Mfg. Co.

Known as Thermoset, the varnish is a synthetic resin type cured by heatinduced chemical polymerization. It sets to an infusable flexible inert film of clear amber color and is high in dielectric and bonding strengths.

Of low viscosity, the varnish will not skin over or gum up equipment with an insoluble film and penetrates the deepest windings to completely fill in-Water- and oil-proof, terior voids. Thermoset is not affected by acids or ordinary alkalis in concentrations. When cured. the material protects enamel coating on magnet wire, will not corrode uncoated metals, and guards against rust.

In applying Thermoset to a winding, the unit is soaked until bubbling ceases. Winding is then drained and baked at 275-300F. until thoroly cured. Baking time depends on the size of the unit and usually ranges from 6 to 24 hours.

Gulf Cutting Oil Booklet

Just off the press is a helpful and interesting new booklet, published by the Gulf Oil Corp., Gulf Building, Pittsburgh, Pa., which is available to production men in metal working plants.

In addition to information on the properties and uses of improved Gulf cutting oils, this booklet contains valuable and practical notes on cutting speeds, tool settings, etc., in the machining of nickel steels, stainless steels, high speed steels, the wrought bronzes and aluminum—plus facts on the cemented carbides as used in metal cutting, and hints on tool supports, tool holders and tool grinding. The text is supplemented with many diagrams and tables.

Safety

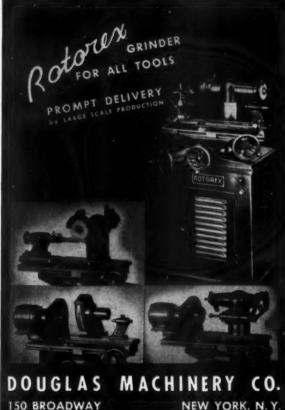
"What does an occasional accident matter?" the man in the shop may ask. 'The shop will keep on running anyway."

Perhaps he has forgotten how he and a dozen other man spent half an hour just looking on while the fellow was carried out feet first on a stretcher. Perhaps he forgot how his o w n production was held up an hour because of an accident down the line somewhere.

Fire is a greater industrial menace now than ever before. Plants are using more flammable materials. and under more difficult conditions of faster production by greener hands. In addition is the risk of incendiary fires and sabotage. But the same precautions that prevent accidental fires will also make arson more difficult.

The menace of sabotage is a real one. Every company should co-operate to the fullest extent with the Federal Bureau of Investigation, which has offices in leading industrial cities. Running down sabotage is no job for a correspondence course sleuth.

One of the most useful of Hitler's stooges is the rumor monger-the guy who spreads tall tales about saboteurs, bad conditions and low morale in camps, defeatism, or just plain gloom.



NEW YORK, N.Y.

Sabotage is of particular importance to the safety department because the foreign agent tries to make his work look like a genuine accident. Often, as in the case of fire or explosion, there are no clues left, or at least none that an amateur would recognize. The F. B. I. however, can usually tell whether disaster is due to sabotage or carelessness in the plant.

(From an article by Carman T. Fish published by National Safety Council.)



Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. Write for bulletin.

Mohr Lino-Saw Co.

B & S Magnetic Chuck Catalog

A new 16 page catalog has been issued by Brown & Sharpe Mfg. Co., Providence, R. I. describing their magnetic chucks and other magnetic holding tools. The catalog is well illustrated with pictures of the chucks in use, together with drawings of how they work.

Among the advantages claimed for the B & S chucks are these:—no electricity, economy, no heating of work, safety, portability, long life, and adaptability.

Packaging Booklet

A 28 page book issued by Clark Tructractor, Battle Creek, Mich., describes the Unit Packaging System for speeding inter-plant movement of materials, parts, and sub-assemblies with minimum loss in transit and saving in packing materials.

Materials are packed in much larger quantities. A machine is used for handling these packages speedily and with a minimum amount of less skilled lahor.



Acme GLASS OPTICAL FLATS!

Measure in Terms of Millionths of an Inch! A Test for Flatness, or an Accurate Comparator. * Acme optical flats and Monochromatic light furnish (in connection with your gage blocks) the lowest cost equipment capable of measurement in terms of millionths of an inch.

Measure in Terms of MicroInches by Light Waves

In spite of the extreme accuracy possible with light wave measurement, the procedure is very simple. Place an Acme Glass Optical Flat on your work and gage, as shown in the above illustration. Any variation in size of the work, is easy to detect and determine exactly in terms of millionths of an inch.

See illustration at right. The straightness of the bands formed by interference of light waves reflected from the flatlapped steel surface gives a true measure of list flatness.

For the best of all checks on flatlapping and flat work surfaces...for a close watch on your precision gage blocks... equip with Acme Glass Optical Flats and Monochromatic lamp. They result in BIG SAVINGS on assembly time, re-working, and insure superior product performance.





Acme Advice is Yours for the Asking

ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts
210 N. Laflin St. Chicago, III. MONroe 4122

Substitutes

Development of new uses for moly bden u m, of which the U. S. is said to produce 90% of the world's supply, has been reported by Dr. A. A. Bates, manager of chemical and metallurgical departments of Westinghouse.

Because nickel steel is in great demand for shells and armor, molybdenum and chromium are now being used in place of nickel as the strengthening agent in steel shafts, bolts, gears, and other highly stressed parts machines as motors and generators.

When tungsten was added to the list of strategic materials, a substitute was needed for high-speed tool steel, which contains a bout 18% of this metal. Molybdenum was the natural substitute, and tools using only a few

per cent tungsten are being used widely.

Molybdenum is a late-comer to the production line, partly because the nation's great stores of it were discovered in comparatively recent years, and partly because of difficulties metallurgists had to overcome in learning to produce and heat-treat alloys containing it. But these alloys are said to be equal in quality of their tungsten predecessors.

Nickel and chromium, as well as tin and zinc, are among the favorite plating



materials which protect steel and other metals from rust. As these went on the priority list, substitutes were discovered. Then substitutes for substitutes had to be found. Glass and enameled iron were substituted for aluminum in dishes, trays and other household appliances.

Stainless steel was substituted for aluminum in one product. As the chromium in the stainless steel went under priorities, nickel plating was planned. Enameled steel was the final substitute.

Plants for Sub Contract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Goverment Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARrison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in The BLUE BOOK. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-32—New York City firm has been doing subcontract work but has additional capacity. Floor space 12,000 sf exclusive of warehouse. Personnel:—4 toolmakers; 4 expert mechanics; 8 lathe operators and all-around men; 5 turret operators; 6 bench men; 2 helpers; 5 female casemblers accustomed to light dexterous work. Equipment includes;—Prentite geared heavy duty laths 18'x8'; Monarch quick change lathe 15'x6'; 2 Seneca Falls loose change gear lathes. 12'x5' with metric thread conversion attachments; 3 Logan precision lathes 10'x5' (rall lathes fitted with turret trailstock attachments and 4-way tool posts, also draw-in chucks and collets); 2 Morey 2G turret lathes (new) 1'' bar feed and collet capacity; LeBlond plain milling machine; US Tool No. 1 production miller with vertical attachment; Potter 6 Johnson 24'' heavy duty shape; Kelly 16'' shaper; Warmer light power forming and stamping press, 6s60'' die size, open end housing; foot press 3½'' discharge opening, \$10'' to seat; 85 Surface grinder, 6½x20'' with magnetic chuck; Canedy-Otto heavy duty back geared drill press, to center 14'' circle; 4 Delta sensitive drill presses; Rearwin profile filing and sawing machine; Flyball broaching and arbor press;

Racine heavy duty hacksaw 6x6"; 6x24" cylindrical grinder (for early delivery) 2 tool post grinders and the usual bench equipment, gages, testing instruments, heat treating, light welding and paint spraying equipment.

welding and paint spraying equipment.

H-31—Midwestern firm, specialists in sheet metal finishing, has d-c plating generators, 6 volt, 45,000 amp. capacity; 14 sheet buffing machines; 11 coll buffing machines; square shears 2—6' 16 ga. and 4' 16 ga.; 3 rotary shears No. 1 Waterbury Farrell and 16 ga. 24"; 4 Weisbecker grinders for engravers' plates; combination sheet and coil lacquering machine; 2 crimping machines—3/16" crimp 36" face rolls and 7/16" crimp 38" face rolls; Nickel solutions, approximately 14,000 gallons; copper solutions (cyanide) approximately 2500 gallons; brass plating solutions (cyanide) approximately 2500 gallons; brass plating solutions? Involved approximately 2500 gallons; brass plating solutions? Involved approximately 2500 gallons; brass plating solutions? Involved approximately 2500 gallons; brass plating solutions.

H-36—Sheet metal specialists in Cincinnatia creat offer the following equipment for subcontracting work; -7-20" and 1-30" bar folder for 24 ga. and lighter; 6' and 8' steel brakes for 20 ga. and lighter; 6' and 8' steel brakes for 20 ga. and lighter; 3 power folding machines, 30" to 6' for 24 ga. and lighter; 4 paint coating machines; 6-36", 1-42" and 1-30" Niagara square shears (foot power) and 1-5' Niagara electric power; Robertson, Federal and 2-Toledo punch presses, 1012" 16x32", 15x23" and 28x48"; 2 gang punches; 5 embossing presses; circle shear (Quickwork 48" circle, 18 ga.); cleaning machine; 2 rotary stitters; 6 ovens; 2 riveting machine; 2 stitching machines; Sidney cutoff, straight line cut-off and rip saws; Stone planer; 3 paint making mills and 2 mixers; 4 lithograph presses; 2 gum presses and complete screen process dept.

E-I—A midwest manufacturer, for 40 years prominent in printing trades equipment field, is wide open for light machine shop and assembly operations. Has 14 milling machines, 9 drill presses, 6 engine lathes, 8 grinders, screw machines and various other equipment. Getting some new equipment, too. Commercial tolerances. Accord those for light week-

Getting some new equipment, too. Commercial tolerances. A good shop for light work.

R.2—An Illinois gear jobbing plant with some facilities still open. Operates a grey iron foundry having capacity up to 5 ton castings. Seeks commercial tolerance work only. Machine shop includes 11 turrel lathes such as 3L Gisholts, 3A W&S, Fosters, Acmes and others. Engine lathes from 12 to 21" swing; pulley lathes, 4 grinders, radial drills, slotting mills, Landis threader, etc. Boring mills include 70-72" King; 104" Canada; 34" Bullard; 44" Niles; 60" King. Gear cutters include No. 5 B&S 60" cutter; Lees & Bradner hobber 13" and 2 Lees & Bradner 18" hobers; also 2 GE hobbers (36 and 26"); 1 Pfavter Hobber, 86" 2 No. 6 Fellows shapers; 2 Gleason bevel machines (12" and 25") str. tooth.

ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

All Parts
Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable
Spindles



A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36'x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



ENGINEERS AND MACHINISTS SINCE 1907

MILWAUKEE, WIS.

E.3—Small but capable Illinois machine shop has following equipment: 3½° Greenles turret lathe; 1° Patterson hand screw machine; 2 Cleveland automatics 1-5/16° rnd. capacity, single spindle; planer 24x24°x8°; 3 engine lathes; also welding equipt.

X.4—A modern, efficient Illinois manufacturer of printing press specialties, is canxious to run 100% on war work. Good staff. Close tolerance work. Inspection dept. Also make bench tools such as vises, etc. They have Foote Burt 1½" as automatic screw machine; W&S No. 2 turret lathe; No. 4 W&S turret lathe; Cincinnati No. 1 miller; 14 drill presses; spraying, painting, riveting, finishing depts. Several engine lathes. Tool room.

K-5—An Indiana manufacturer of woodworking machinery seeks some additional work to keep its medium sized plant working 100%. Good mgt. Has 2 hand screw machines; 13 engine lathes; 12 vertical miliers: 7 planers; 3 radial drills; 3 shapers; gear hobber; 4 drill presses; 4 grinders—as well as compete heat treating and various other facilities.

K.5—A midwest casket maker with facilities for metal and wood products, has much open time available for the following operations:— Sheet metal and spraying equipment, various punch presses, press brakes, casting, plating and assembly. A well managed company. K-7—A midwest dairy machinery manufacturer seeks further work for: 2 millers; planer; shaper; 5 drill presses; 5 engine lathes; various punch presses; welding and sheet metal work. Also a lot of miscellaneous tools for light metal work.

H-29—Plant in New York City offers following equipment for subcontract work:—4 11". engine Sebastian lathes, 4' and 6' between centers, geared head direct drive with speed attachment to cut tapers full length of bed; 3 tool post grinders; 16" Monarch engine lathe, 4' between centers, geared head; 1" Hercules turret lathe, handfeed; 2 No. 1 Kempsmith plain millers, 9" x 22" including vertical attachment and 2 dividing heads; B 6 S hand miller with vertical attachment; Bliss 29B press with 2" stroke; 6" power hack saw; ½" power taper, 1½" stroke; 6 Canedy-Otto drill presses, ¼ to 1"; G 6 E shaper 16" stroke x 18"; U. S. E. 14" buffer-grinder; Surface grinder with pneumatic feeds for fine finishes; 4 tool grinders 3"-12"; Campbell nibbler 3'16x6; ½" Mathews name plate marker; Bilgram 6" bevel gear generator; Atlas arbor press; Paper foot sheat; Cyanide, annealing, and bench funces; Coll baking oven; Dynamic balancing machine; armature and coil winders; nickel plating tank; Cyanide copper plating tank; Staff accustomed to making own motors, tools, dies, gages, special attachments and equipment.

H-28—New Jersey plant has 90,000 sf modern, well lighted plant on one floor; 75



"PENCILPOINT" DIAMONDS

FOR TRUING GRINDING WHEELS These diamond tools are regular equipment in the grinding of broaches, form milling cutters, ground taps, punches, dies,

taps, punches, dies, p.2 etc. Send us you inquiries; or blue print of wheel outline for our recommendations. \$1.50 each, discounts in quantities.

For information and circulars write

F. F. GILMORE & CO.

112 DARTMOUTH ST. BOSTON, MASS.





akilled mechanics, aheet metal workers, machinists, electricians, pipe fitters, etc. Railroad siding; hoists to handle up to 2 tons. Interested particularly in machinery subcontract work involving assembly; Equipment includes:—G & E gear cutter, 24" table; Davis keysecter No. 4; American engine lathe 27" swing clearance on chuck work, 14" clearance on centers, 7; American engine lathe, 16" swing, 10" clearance on centers, 10" clearance on centers, 10" clearance on centers, m.d., 6'; Kempsmith No. 3 miller, 36x24" table travel, 16" clearance; Cincinnati shaper 20" stroke; W & S turret lathe 1A, 6' long, 14" swing, 3" bore, 2-%" collet; American radial drill, 54" clearance, 50" arm; Gisholt turret lathe, 24" swing, 6" bore, 6 bed; Bullard boring mill, 50" table, 3" clearance; Putnam engine lathe, 26" swing, 6" bore, 4" swing, 4" swing, 12" learance, 45" table, 12" length, double beads, widened pattern; 3" clearance, ordened

heads, widened pattern; 3' clearance.

H.27—Nebraska manufacturer of pumps, cylinders, jacks, windmills, etc., offers the following equipment;—2A and No. 4 W & Surret latthes, the latter with P & W bore and cir chuck equipment; 24" x 84" Reed engine latthe; 16"448" R.Mc engine latthe; Farwell No. 2 gear hobber, 16" gear capacity, 5.8-8 pitch hobs; Colburn No. 2 2-spindle drill press 1½" drill cap. 20" table 18" chuck to table; 26" Barnes drill press 1½" cap, 36" table chuck; 21" Barnes drill press, 2" cap 36" table chuck; 24x24x60" planer; No. 3 American Can punch press 2½" stroke 6" throat; No. 3 Consolidated press 2" stroke 6" throat; No. 2 American Can presses (2) 2" stroke 6" throat; Sonsolidated square shear 54" 18 gauge; Landis single head bolt cutter 1"; 16" swing cutoff saw: 16" rip saw; 36" band saw 8" capacity; 24" Pay planer, 6" cap. 16" Jointer, Armstrong-Blum 6x6" hack saw; Punch and shear. 1" hole 1/4" steel—1/2x4" shearing cap; Sheet metal roll, 38"x18 qa; Brass furnace, oil burning 1000 lbs. cap. per 8-hr. day; 30" Whiting cupola, capacity 5 tons.

H-26—Michigan Plant with 10,000 sf floor space would like sub-contract work, particularly metal. Has available day shift and could add night shift. Has wide range of equipment, including:—26" metal planer; 3 Engine lathes, various sizes; Horning press; Speed lathe; Drill presses; Metal shaper;

Rivet spinner; Punch presses, No. 34, 1, 2½, 5 Tolecko; Milling machine; No. 3 and No. 6 double end grinding and polishing jacks; Die filer; Hand and pan brakes 38" and 48"; Beading machine; Squaring shears 36", 42"; Welders, foot power with timers; 2 Spray Booths and equipment; Gas fired baking oven; 2 Degreasers; Also, complete wood working cabinet and finishing departments with spray equipment.

H-25—lowa plant has following idle tools for which subcontract work is urgently needed:—Sidney 19" x 8" and Artisan 12" x 28" engine lathes; 2 Garvin 16" x 24" turtel lathes; Universal milling machine, 36" table, 14" throat; Putnam planer, 2' x 6' stationary bed, swinging arm; 2 Kerrihard pedestal grinders; PDQC 2" Pipe threading machine; American radial drill, 36" arm, 60" stroke; Stanley No. 7 and Superior No. 12 drill press; Hobart d-c an 1 WW a-c welders; Chicago 10' hand brake; WJ 5' and 6' hand brakes; Kerrihard 5' and 10' rollers; 2 Ideal 7½ kw. spot welders; PW punch press 4" throat 3" stroke; Peerless 14" power saw; Niagara 10' power shear; 2½ hp Omaha compressor; Spray guns, Oven, etc.

SUBCONTRACTORS WANTED

HH-105—Subcontractors wanted for high priority work which should last for the duration. Tolerances are reasonable. Facilities required; — large Gridley or New Britain chucking automatics; medium and large hand screw machines; broaching machines; thread milling equipment.

HH-105—Desire to contact plant equipped with lathes, shapers, milling machines, grinders, boring mills, etc., for the manufacture of surface grinders.

HH-104—Company in New York City wants names of plants capable of handling subcontract work such as the building of fixtures on special tools of all kinds to specification. Prefer plants within a radius of 50 miles from N. Y. C.

HH-103 — Chicago firm seeks plants with external and internal grinding equipment, lathes, turret lathes, milling machines, shapers, etc.

HH-102 — Wisconsin manufacturer seeks lathe, screw machine, boring mill, grinding, planer, shaper and milling capacity in precision shops open for subcontract work.



SCREW MACHINE SET-UPS

BROWN & SHARPE AUTOMATICS

George L. Detterbeck Co. Formerly Banner Mfg. Co.

1871 Clybourn Ave.

:-: Chicago, IIL

Silver

Exclusive tests by Handy & Harmon, now directing the American Silver Producers' Research Project, are claimed to have proved that joints brazed with silver allovs a r e readily made stronger than the metals brazed.

This is not always true of butt ioints, altho tensile strength as high as 134,000 psi has been obtained when properly made.

Design and particularly area of joint is probably the most important factor controlling its strength. It is far, however, from being the only factor. Others include kind of metal joined. clearances between parts, and skill of operator. All these factors can be controlled within reasonable limits.

It has been found that usually a joint maximum has strength when clearances into which silver alloy is flowed are about

.0015". In tests using stainless steel and silver brazing alloy, any properly made joint under .005" clearance was claimed to have at least 100,000 psi tensile strength.

It has been shown that silver alloys penetrate into small clearances, and since joints with such clearances are strongest, it is wasteful to provide wide clearances or fillets as is often done with soft solders. It follows that little brazing alloy per joint is required.



The ever ready versatility of

Racine Variable Volume Hydraulic Pumps makes them easily adaptable to your individual industry! Racine Pumps and Racine Valves are cutting costs in hundreds of widely different applications ranging from plastic molding to mining machinery, and they can be put to profitable use in your own plant. Our engineers will aladly consult with you. Write Today!

DEPENDABLE VARIABLE HYDRAULIC POWER! Delivering hydraulic power in 12-20-30 gal. per minute capacities, Racine Pumps automatically maintain any desired pressure up to 1000 lbs. per sq. in. without by passing of oil. Racine's variable volume feature reduces horse-power

consumption, lessens oil heating. Simplified construction provides smoother, quieter operation, lasting dependability.

Racine, Wisconsin

1764 State Street WRITE FOR NEW FREE CATALOG P-10-A.

> and cost per joint is correspondingly low.

> In ships, piping takes up much valuable space. When silver brazing alloy is used instead of threaded joints, thickness of pipe can be reduced about 1/2. It can also be installed more quickly.

> Silver alloys are used in airplane engine coolers and radiators, ignition systems, cabin heaters, fuselage construction, parachute rip cords, anti-aircraft guns, machine guns, anti-tank guns, shells, and torpedoes.

RUGGED! NEW -AND DIFFERENT



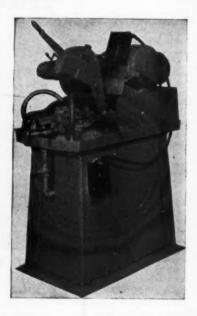
This new Type 25 Bench Drill is a marvel of streamlined efficiency and simplicity. Note carefully the following features: Rugged Strength, base and column are only two castings. Direct Drive, with single bett from motor to spindle. Totally Enclosed, with no moving part exposed except the drill chuck. A versatile machine for a variety of light work due to an infinite range of speeds thru variable speed drive 1500 to 10,000 R.P.M.

Write for detailed information.

PRODUCTION MACHINE CO.

Radiac Abrasive Cut-Off

A new Radiac Type N Abrasive Wet Cut-Off Machine has been introduced by A. P. deSanno & Son, 442 Wheatland St., Phoenixville, Pa. It is adaptable for cutting off bars, tubing, and formed shapes.



Coolant is directed onto wheel and work at point of cutting, and is said to increase wheel life, reduce cutting heat, and minimize tendency to burn. It is claimed cut seldom requires additional finishing.

Vises may be supplied in 2 types—straight for straight cuts only, and swivel for straight or angle cuts up to 45°. Among the special features claimed for the machine are these:—hand operated vise, non-tiring handle, use of stubs of larger abrasive discs from larger cut-off machines, and elimination of vibration.

Sabotage

In order to insure continuous production of vital war materials. it is urgent that all steps possible be taken to prevent sabotage of w a r production facilities. J. W. Irwin, assistant to president of Monsanto Chemical Co. recently of-fered some suggestions.

Saboteurs have 2 methods of gaining access to war plants: thru employees, contractors, and those who normally have admission privileges; a n d thru force or subterfuge.

A t Monsanto. every new employee is fingerprinted and his record checked by the FBI. This in itself tends to keep undesirable persons from seeking employment. All employees are issued photographidentification

passes which are carefully checked on entering, and sometimes leaving. Most employees are issued numbered buttons to wear, and are subject to immediate detection without one. treight cars, etc. coming onto the property are subject to close inspection also.

Physical protection of the property includes fencing placed where saboteurs cannot go over or under it. Gates are kept to a minimum. Floodlighting is provided, and is arranged so there are no dark spots in vital places. Wires and other apparatus are placed within



150 BROADWAY, NEW YORK, N. Y., Dept. 805

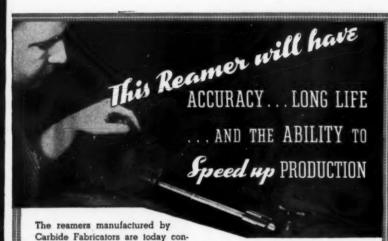
the patrolled zone and high enough to prevent tampering.

Armed guards constantly patrol the plants. They are chosen for their youth, alertness, physical bearing and integrity. They are uniformed, as that gives than an added sense of responsibility. Some plants have used police dogs to advantage, not only for their own abilities, but also to serve as companions to patrolmen making lonesome rounds.

In helping protect vital war production plants, the Federal Bureau of Investigation is glad to offer advice.

Mechanics Through the Ages





tributing materially to faster, more efficient War Production. They are made to the accuracy that provides the most uniform results in production reaming. Because they are produced by an organization with many years of experience in working with cemented-carbides, they can be depended upon for lasting wear-resistance. Being sturdy, durable tools, they permit a stepping-up of usual R.P.M.'s in reaming operations.

Carbide Fabricators cemented-carbide tipped reamers are supplied in both expansion and solid types. A complete catalog outlines the various exclusive features of each type and lists prices for the entire line. Write for your copy.

NEW FACILITIES FOR CARBIDE FABRICATORS

Construction is now in progress of a new, modern Carbide Fabricators plant. With the additional facilities which it will offer, a much greater production volume of cemented-carbide tipped tools will be possible. Up until recently, we have been able to maintain 24 to 48-hour delivery service on almost all standard lines. The completion of this new plant —and the securing of additional equipment—will aid immeasurably in re-establishing our usual prompt delivery schedules.



Carbide Fabricators MICHIGAN

SPEED-UP PRODUCTION

FAMCO FOOT AND ARBOR PRESSES





Production will win the war. Step-up your production and assembly operations requiring percussion and pressure with FAMCO Presses. 40 STOCK SIZES AND MODELS. Write for details. FAMCO Machine Co., 1320 18th St., Racine, Wisconsin.

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SPEED-UP YOUR RIVETING OPERATIONS

A great help in Offense Production, these Grant Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. Information?





THE GRANT MFG. & MACHINE CO.

C. E. Station. Bridernart, Conn.

Quick Calculation of Milling Speeds

One of the ever-present problems confronting machine tool operators, set-up men, and production supervisors is to run the machines at their highest speeds consistent with the greatest number of pieces per sharpening of the cutters. This is especially



important today, because of the rapid production requirements expected of every machine tool, and the need to keep cutter breakage at a lower percentage than ever before.

Men having little shop experience are inclined to run their machines at either one of the two extremes:—over-cautiously slow or so fast that the cutters burn. Both conditions can be a rather serious drag on production, especially where high priced consumable cutters are employed, as on milling machines.

In order to make it possible for the operator of a Cincinnati Dial Type Milling Machine to select the correct spindle rpm for any combination of work, tool materials and cutter diameter, without guessing or paper work, the machines are now equipped with the built-in milling speed calculator shown.

It is, in effect, a circular slide rule, especially designed to solve this particular type of problem. No knowledge of mathematics is needed. The calcu-

Special Box, Convenient to Use

ATLANTIC * BAND SAW BLADES

Speed Up
Metal Cutting Production

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

> Send for Free Booklet

ATLANTIC SAW MFG. CO.

Metal Cutting Band Saws Exclusively

153 Brewery St., New Haven, Conn.



A Storage Unit That REDUCES HANDLING

of Parts and Materials

Because Stackbins are portable containers...not fixtures...parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed...without disturbing any other bin.



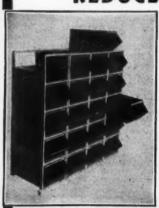
STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly.



STACKRACKS are individual units which lock together to form storage racks of any size, shape or capacity, into which Stackbins slide like drawers.

STACKBINS in STACKRACKS offer a storage system that reduces handling, saves valuable space and speeds work. Write us for complete details and low prices.

STACKBIN CORPORATION 55 Troy St., Providence, R. I.



"Stacked and Still Accessible"

lator consists of one stationary disc and two rotatable discs, with a semicircular cover plate in which are two windows.

On the periphery of the stationary disc are scaled various cutting speeds from 20 to 4000 fpm. On top of the larger movable disc, cutter diameters are given, while at the bottom, cutter rpm appear.

The illustration shows the setting as made by an operator who had a set-up of SAE X-1112 steel with a 3" diameter high speed steel cutter. He set



AVOID INJURY — SPEED PRODUCTION

Husky, weided steel construction WIRE REELS with a capacity to handle up to 300 pound wire coils with coil arms adjustable from a minimum inner coil diameter of 10s to extreme diameter of reel. Shiftweight is anariproof and easily handled by one man. Operates smoothly and will give years of trouble-free service.

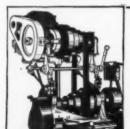
Write for folder giving complete details,

MOSLO MACHINERY INC. CLEVELAND, OHIO 4516 SUPERIOR



the small disa so that "high speed" showed in the lower window, and the larger disc so that the arrow in the upper window pointed to "3"-the cutter diameter.

Following the arrow in the "SAE X-1112" section of the smaller disc, he finds that the correct speed is in the range 95-130 fpm, and that when using a 3" cutter, the spindle must be set to operate at 142 rpm. All of the rpm values given on the calculator are those available on the Dial Type Milling Machine which he is operating. These machines have 21 spindle speeds, in approximately geometrical progression.



Remco brings

quiet, vibrationless power is transmitted by Remco Motor Drives. The motor takes hold by gradually slipping the belt-simple friction clutch action. No noise. Speed changes made without removing tool from cut. No tool marks. Rigid three point suspension, instead of the ordinary one or two points. Drive easily installed, at very low cost. Write! Remco Products Corp., State St. at R. R. York, Pa.

REMCO MOTOR DR

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



Make 75 pieces as shown, 3/16 mild steel. Pieces must be die cut, accurate to size, shape, and duplication throughout the entire lot.

If it is costing you more than it is worth to produce such runs in small lots, which are so important but so troublesome—all jobs can be handled by our methods and process at a comparatively low cost. It will pay you to investigate the amazing facts of the economy of blanking and piercing of such large parts by our system. We now have blanking pressure on such large blanks up to a maximum press tonnage of 500

Write today for facts and representative samples.

tons.

DAYTON ROGERS MANUFACTURING CO.

NEW YORK

MINNEAPOLIS, MINN.

CHICAGO

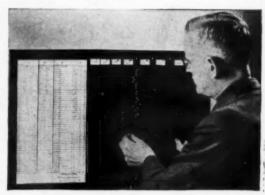
Materials Control System

Busy industries are welcoming the new "Produc - Trol" system which enables production and purchasing executives to quickly see all facts concerning raw materials, parts, assemblies, machine and man hours. Information of this kind is especially essential where multiple - shift production is maintained.

"Produc-Trol", which was developed by the Wassell Org., Westport, Conn., lists parts, assemblies, s u b - assem -blies, or individual op-

erations on a part, at the left of the board. Movable tapes working from left to right on pulleys bring all pertinent facts into instant focus.

Double rows of peg holes under the movable tapes, and various colored pegs, permit many arrangements of comparative data and control, required



for any operation. "Produc-Trol" units are available in sizes to fit specific needs; models are also available for individual and group incentive plans.

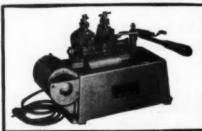
Grinder Handguard

A handguard for grinders has been designed recently by Industrial Gloves Co., Danville, Ill. This new piece of specialized hand protection is claimed to be made of tough chrome tanned cowhide reinforced on the back where the wear comes, with extra patch of leather steel reinforced.

The guard is mitten type, open at end to give free use of fingers in picking up parts or tools. It is built to be worn over regular glove or mitten. All seams are stitched with steel thread making guard practically rip proof, it

is said.





BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to 1/4" wide may be welded.

I KVA_110 Volt_60 Cycle—single phase— 5 point heat control—I point anneal heat— Weight 40 lbs. Let us send you further details. Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

7325 M.DONALD AVE. WELDEX INC., DETROIT, MICH.

Eastern Announces Hot Liquid Pump

Eastern Engineering Co., New Haven, Conn., announces a newly engineered "EH" Midget Hot Liquid Pump, Compact in size, it is suitable for handling hot liquids up to 500° F.

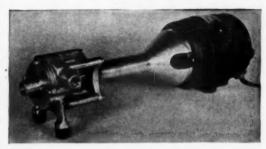
Of the Centrifugal type, it is 12" long x 4" wide x 4\%" high and

weighs 7 lbs.

A 1/20 hp universal fan cooled motor is employed for use on 115 volts, a-c or d-c. Stuff-

ing box is accurately adjustable by means of an easily accessible adjustment ring. Coupling-motor and pump are coupled thru a 5" heat radiating tube. Shaft is supported by outboard ball bearings.

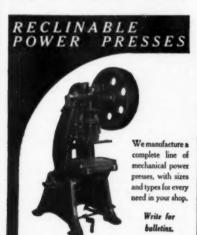
Maximum pressure is 21 pounds psi and maximum volume is 71/2 gpm. Pumps are manufactured in stainless



steel, monel metal, chromium plated bronze, Hastelloy "C" and other alloys. Units can usually be delivered in one week from stock. Hammond Abrasive Belt

Surfacer

A new modern "600" Dri-N-Wet Abrasive Belt Surfacer is announced by Hammond Machinery Builders, Inc.,



ZEH & HAHNEMANN Newark. New Jersey



The BUFFER-SLOT COUPLING lengthens the life of your Motor-Driven Machines by absorbing the load shock and constant vibration that gradually wear out machinery and bring on shutdowns and repairs.

BUFFER-SLOT COUPLING

It not only gives you all the advantages of the ordinary Flexible Coupling but it goes a step further and restores that cushion driving torque lost when you discard-ed Belt Drives. It is long lived, depend-able and especially adapted for use with machinery having Ball or Babbitt Bearings.

SEND FOR BULLETIN No. 24-B

ROWN 126 N. THIRD ENGINEERING CO. READING

-GEARS-

Spur-Helical-Worm-Bevel-Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO. 1919 E. 61st St., Cleveland, Ohio

CUTTERS

The Standard of OUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

Write today for prices.

Few Territories Open.

QUALITY TOOL WORKS Market St., Waukegan, Illinois 1614 Douglas Ave., Kalamazoo, Mich.

Machine can be adjusted from vertical to horizontal position while it is running. Belt tension and tracking device can likewise be adjusted while



running. This is quickly accomplished by 2 convenient handles. Machine is totally enclosed for safety and is arranged for an individual dust collector or for connection to an exhaust system. Work table can be adjusted to any desired working angle.

The floor model illustrated has all the features of the "600" Dri plus providing wet operation for grinding, polishing or surfacing. It is equipped with tank and pump unit. Both bench and floor models can be equipped for water main connection only. Both are equipped with damper or spray control and 2 nozzles for uniform spraying. Should dry operation be desired at any time on either machine, all that's necessary is to turn off the water, remove drain connection and attach air exhaust system at this point. Vacuum cup drive pulleys, eliminating belt slippage are furnished on wet machines only.

Air Conditioning

Formerly thot of simply as a means of comfort, air conditioning is now becoming an important means of stepping up war production.

By cooling and purifying the air. a i r conditioning helps workers to work faster and more efficiently. thus speeding production and reducing rejects. In addition. standard izing temperature, it eliminates errors resulting from contraction or exof the pansion material due to weather variations.

In metal working, it also helps prevent rust, protects finishes, and helps make closer tolerances possible.

Temperature variations affect the quality of war production, which demands toler-ances down to .001". Yet a steel bar

exactly 36" long at 60° becomes 36.0035" long at 90 F.

Parts are often shipped hundreds of miles to the points of final assembly. Parts made in Detroit in April may be assembled in Kansas City in June under entirely different temperature conditions. Air conditioning permits parts to be made and assembled under identical temperature conditions.

According to Paul Zimmerman, vicepresident of Chrysler's Airtemp Divi-



Random (nonsynchronous) switching of resistance welding current causes as much as 50% variation in the heat produced in short-time welds.

Westinghouse Synchronous Timers deliver uniform heat—prevent unpredictable "transients" which produce many burned, warped or cold welds. They start and stop weld current on the zero point of the wave. Since wave form is identical, all welds are identical in strength and soundness.

Synchronous Timers are essential to uniform production welding of critical alloys and thin materials. They are available for spot, seam, or pulsation welding. Ask your Westinghouse representative for full data. Or write Westinghouse Electric & Mfg. Co., Dept. 7-N. E. Pittsburgh, Pa. J-21191

Westinghouse

RESISTANCE WELDING CONTROL

sion, many case histories are on record to show that air conditioning definitely steps up production. An outstanding example is the engineering and drafting rooms of the Detroit Edison Co., where time studies showed that efficiency of employees increased 51% after installation of air conditioning.

Another example is that of American Tobacco Co., Philadelphia, with a 10% increase in production, drop in reject from 4 to 1%, and average daily illness absences cut from 50 to 5.



BUY Quality



Speed & Feed Calculators

Selecting the proper speed and feed rate is highly important in these times. Too rapid a speed may cause a great deal of damage to machine and material. But an overcautious slow speed wastes time when every minute is vital.



To help speed the war effort, Cincinnati Milling Machine & Cincinnati Grinders, Cincinati, O., have developed the Cincinnati Milling Calculator for the handy selection of the right feed and speed.

Size and kind of cutter, work material, depth of cut, cutting speed feed rate, and hp required are all calibrated on the dials of the calculator. By setting dials for each situation, the most effective combination of speed and feed is determined from the standpoint of power, tooth load, and finish.

Complete directions for setting the dials are printed on the calculator, and other details are given in a handy book-let accompanying the calculator. Price is 50c.

Porter-Cable 7" Metal Shaper

A new "Seven Inch" metal shaper is being introduced by the Porter-Cable

"Don't Neglect Your Tool Room" —INSTALL SEVERAL— OLIVER MAKING MACHINES



We also build: Drill Grinders— Cutter Grinders— Face Mill Grinders— Tool Bit Grinders To speed up Defense Output on Dies-Gages-Cams - Templates - Experimental Work, etc.

Savings are large-work is more accurate -you require less skilled operators.

A real opportunity for saving at a small investment.

Send for Bulletin Today.

OLIVER INSTRUMENT CO.,

1408 Maumee Street, East, Adrian, Michigan

Can You Equal This Speedy Production Vise

Easier to Operate! Easier to Adjust!

Simply move sliding jaw up to work, then press down on lever. To disengage, just raise the lever and the jaw moves away from work. Quickly adjusted to different pressures for different kinds of metals, eliminating danger of distortion.

The only vise with a jaw that travels from "closed" to maximum opening (4½") at single movement of lever. Saves time in getting the work in and out of vise. Ideal as a drill-jig milling fixture, and for tool-room use.





Supplied with or without jig bushing plate. Saves time and cost of making special drill jigs for small production jobs.

D. A. SMITH & CO. 8085 Livernois Detroit, Mich.

Free

DRESTO-VISE



You can hear easily in this Acousti-Booth

You can stop costly errors—and hear phoned instructions easily—if you put your shop phone in a Burgess Acousti-Booth. This remarkable doorless booth is quiet inside. Patented Acoustic Construction—Factory racket can't bother you in this booth, because noise is soaked up by sound absorbent walls. It has no door; hence there are no mechanical parts to maintain. Always airy and easy to keep clean.

Available at Once—Constructed of noncritical materials, a limited number of these booths are still available without priorities. Send for illustrated booklet and prices, or ask for free trial.

Mail Coupon for Free Booklet

Burgess Battery Company, Acoustic Division 2817-D W. Roscoe Street, Chicago	2
Please send illustrated booklet describing th Burgess Doorless Acousti-Booth and how	it
works.	
Name	
Firm Name	-
Street-City	
Operating under Burgess Patents	

BURGESS ACOUSTI-BOOTH



Machine Co., 300-3 Exchange St., Syracuse, N. Y. It is a self contained motor driven unit with motor and speed change control mounted in floor pedestal. Length of ram travel is 7%" and, driven thru "Any speed" control, operates at any speed from 64 to 175 strokes per min.

A 4" diameter tool head swivels 360° and travels 236". Ram is 161½" long by 5" wide. An 8" by 8" by 7½" table has a traverse of 10½" and vertical travel of 5½". Table adjustment is by means of a conveniently located hand-wheel. Most adjustments are made without wrenches, others with a single wrench.

For smoother operation, this shaper has sprocket and chain drive, and an extra heavy crank pin plate is said to keep chatter to a minimum. 6 cross feeds are obtainable from .002 to .012. Tapered pins for quickly locating head and vise, and micro set ram for quick set up are some of the features on this new shaper. Equipped with standard ½ hp motor, and pedestal, it is approximately 51" high over all.

Training Workers

In the past 18 months more than 50,000 new workers have been trained by General Electric for war production work. Virtually everv peacetime occupation is represented in this force of new workers. Some making the greatest progress have had little or no previous factory experience.

A former orchestra leader, Benny Rapp, operates a huge planer and recently re-ceived a bonus for suggesting a better way to do a job. A Baptist minister works 6 days a week for war work and conducts Sunday church services the seventh.

An operator of a machine in the marine turbine department was an insurance salesman for 7 years. Chefs now run a turret lathe and a screw machine.

former head waitress is now leader of 12 girls making magnetos for fighting planes. 9 people without previ-

ous shop experience run lathes in the same plant.

In charge of a jig borer is a farmer, who, when asked if he had ever operated a machine tool before, said:-"Nothing but a cultivator."

Because of the shortage of highly skilled men, tasks which in peacetime were performed by a single expert worker, now have often been broken down by G-E engineers into several simpler operations which can be performed by less skillful persons.



In addition to its regular apprentice course, now 40 years old and which requires 3 years to complete, new workers are now being trained by 3 different methods at G-E.

At plants with large machine rooms for regular apprentice training, short time trainees are taught a single machine operation on a second shift. Employees are hired for a specific job and trained on the job with an instructor. The final method is to put the new employee to work as an extra man on a machine.

Lincoln Forced-Induction Pumps

The Lincoln Engineering Company, 5701 Natural Bridge Av., St. Louis, Mo. are now manufacturing forced-induction pumps known as the "Pile Drivers." They are designed to dispense heavy, viscous materials such as sealing compounds, sound deadeners, insulating materials, putty, heavy lubricants and other substances too heavy and solid to prime in any other type of pump.



Anglo Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors. Surface and Lapping Plates, Prompt Belivery.

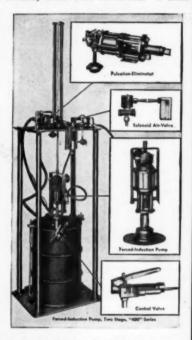
TATRA TOOL CO.
16317 Sanford Ave. - Cleveland, O



The GLENNY Adjustable-Expansion BROACH

Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor presmechanical or hydraulic presours. Speeds up production. Cutter hars in carbon or high speed steel. Details 2 Write!

EAST SHORE MACHINE PRODUCTS CO. 833 E. 140th St., Cleveland, O. They are available in single or 2-stage models, both with air-motor. 2 sizes



can be furnished—the "100" for pumping materials from containers up to 10-gal (100-lb) capacity, and the "400" for pumping material from 55-gal,

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hormel-M Grinder is startily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite labrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP. 96 Warren St., New York, N. Y.

LOWER PRICES— PROMPT DELIVERY

You save four ways when you order Willey's General Purpose Tools:

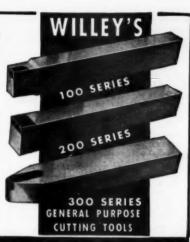
- 1. Lower prices, just announced.
- 2. Increased production.
- 3. Lower operating costs.
- 4. Prompt delivery saves down time.

Tipped with Willey's Metal, these tools are suitable for machining cast-iron, tough hard rubber, bakelite, fibre, and tough alloy steels.

Standard tools, in many cases, will handle 90% of your requirements. Special tools quoted on request.

Write for BULLETIN 142

Quotes new prices on all grades, sizes and classifications of Willey's standard tungsten carbide cutting tools and blanks, and Torpedo Type Wheel Dressers.



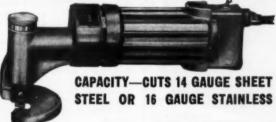
WILLEY'S CARBIDE TOOL CO.

1344 W. Vernor Highway,

Detroit, Michigan

GES Electric Hand Shears

NOW AVAILABLE - FOR NATIONAL DEFENSE



This new sheet metal shear was brought out to full the demand of the sheet metal industry for a very light weight but powerful, fast cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a life time of service. The ball bearing "Grip" type Universal motor 1/2 horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new model has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6' 6' per minute on 14 gauge sheet steel. Write for further information.

James W. George Machinery Company
3146 EAST JEFFERSON AVENUE.

DETROIT, MICHIGAN

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vine Ho.	Width of	Opens	Weight
	Jaw, Inches	Inches	Pounds
1D	31/2	31/2 51/2	121/2

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA



Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact easy to use—dependable.

Send for details-5-day FREE TRIAL OFFER!

Luma Electric Equipment Co. Dept. H-Main P. O. Box 132, Toledo, Ohio (400-lb) drums. Each can be arranged as a single or 2-stage unit, depending on requirements.

The single-stage unit is for use where pulsation in flow of material is permissible. The 2-stage unit has a pulsation eliminator which does away with the pulsation and delivers the extruded material at an even rate of flow and in uniform size and shape as desired. Delivery of materials in both models is controlled by a hand operated shutoff valve at the outlet and is always under control of operation.

30-For-One Method Boosts Gun Output

Use of mass production technique to speed toolmaking in ordnance manufacture was disclosed when an official of a large war plant told how 30 semiskilled workers were trained to do the job of one specialized craftsman.

Because of the difficulties of obtaining expert toolmakers, who require 5 or 6 years of training, production managers of a large automobile plant were faced with the problem of using semiskilled labor to turn out intricate gun parts. It was explained that approximately 30 hours of an expert toolmaker's hand filing was required after machining was finished on each piece.

Therefore, if they wanted to get out 10 guns a day, it would take 300 hours, or 37.5 toolmakers per day. So the operation was broken down. In place of having one man file 30 hours, they decided to have approximately 30 men file for one hour each.

It was necessary only to educate each man for a small part of the total filing, and because it was always the same part he was trained to file, the worker became very proficient on the operation in 30 days, and that job was licked.

Matthews Stamping Catalog

A new 16 page supplementary catalog has been issued by James H. Matthews & Co., 3942 Forbes St., Pittsburgh, Pa. describing their steel stamps and steel type holders. It is profusely illustrated with pictures of their many kinds of stamps, types, and symbols.

Diamonds

Altho diamonds are of the hardest substance known, they may be shaped to a sharp cutting edge similar to the point of a miniature cutting tool and then mounted into a holder.

Industrial diamonds are found in the same mines as gem stones, but do not have their value because of poor color.

Skilled diamond cutters use lapidary wheels to cut the stones in much the same way as gems are cut. Altho the value of an uncut diamond is much less, it costs as much to finish them as it does a jewel. Thus the large expense of industrial diamonds must be justified, and they must be used efficiently.

Their superiority is due to their extreme hardness and resistance to abrasion, in addition to the fact that they

can be sharpened to produce a very keen cutting edge which will not soften at high tool temperatures when cutting hard materials. Also their polished chip turning surfaces do not pick up or drag soft non-ferrous materials such as copper or babbitt.

By taking light cuts, diamond cutting tools, in machines of suitable rigidity and freedom from vibration, have been used to turn and bore drawing dies made of tungsten carbide, the hardest known metallic material. Diamond tools are in daily use in many turning and boring operations on brass and bronze, and other materials where



of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

JACKSON

MACHINE & TOOL COMPANY SALES DIVISION 956 Roberts St. Jackson, Michigan

excellent finish without subsequent polishing is required.

Diamonds are often very brittle. Some stones have planes of cleavage, like a piece of slate, and will split or fracture under the impact of a light blow. With the recent improvements in cemented carbides, the uniformity of this material has been increased to compare favorably with that of diamonds, at a considerably lower cost.

This material was taken from an article by Carroll R. Alden appearing in the April issue of Ex-Cello Tool Tips, available from Ex-Cell-O Corp., Detroit, Mich.



ON THE NEW ATLAS DIE-FILING MACHINES



Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The
holddown fingers are attached directly to the overarm. Working surface of the table, which tills two
directions, is entirely clear. An improved type chuck,
consisting of movable hardened jaws, holds both
saws and files. Screw adjustment makes changes
easy and fast.

Price, complete with motor- \$125.00 Net

F. O. B. CHICAGO

ATLAS EQUIPMENT CO.

102 S. Clinton St., Chicago, III

Micron Gear Hobber

A new model No. 1 American Micron Hobbing Machine is offered by Triplex Machine Tool Co., 125 Barclay St., New York City. It is designed to generate accurate spur and spiral pinions and gears, right hand or left hand, up to 6" diameter and maximum DP 12, such as are used in small precision machines, instruments, meters of all kinds, clocks and mechanisms requiring similar gear accuracy.

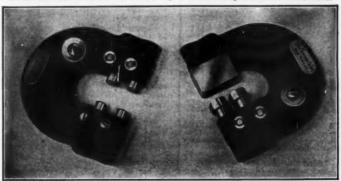


Gear blanks are firmly held on a work arbor. For chucking pinions with integral shafts, spring collets with holes up to %" diameter can be furnished for mounting in the tapered hole in the work spindle.

Hob spindle is mounted in the headstock which in turn has a swivel base that can be set to the proper helix angle for hobbing spiral gears. Hob spindle assembly is mounted on carriage which performs the automatic longitudinal feed. Length of automatic traverse of carriage is 5". Power feed is actuated by a lead screw in base. This lead screw is driven by work rotating

ADJUSTABLE LIMIT SNAP GAGES

Many plants engaged in war work are using Adjustable Limit Snap Gages to quickly and accurately measure mass produced parts urgently required. Atlantic Adjustable Limit Snap Gages are manufactured to American Gage Design Standards. Gage frames are made of Meehanite. Write today for folder. Prompt deliveries in most sizes.



WRITE, WIRE OR TELEPHONE CA6-1464 FOR PROMPT SERVICE.

GEORGE SCHERR 122 Lafayette St., New York, N. Y.

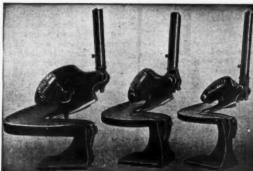
Save time-labor-money on RUSH orders! Cut metal any shape without distortion! Hair-line accuracy every time! Built to last a lifetime. Anyone can operate! Install one or more of these money makers now!

MADE IN 3 SIZES

No. 1 — cats 14 gauge — wt. 15½ ho. No. 2 — cats 10 gauge — wt. 33 lbs. No. 3 — (Equipped with hall bearing hold-slower derice) cats 3/16 inch mild steel wr 10 gauge stainless — wt. 55 lbs.

BEVERLY SHEAR CO., 3005 W. 110th Place, Chicago, Illinois

SHEAR IT CLEVERLY WITH BEVERLY



BEVERY Throatless BENCH TYPE SHEAR



Get Catalog !

Get

Prices!



SPEED UP! WITH THE CATSKILL MODEL W— WET TYPE

CUT-OFF MACHINE

Fast, smooth cuts in solids to 2°, tubings and shapes to 3°. Will not burn or leave objectionable burn. High alloyed hard steel and many other materials.

> Write for detailed information, Rulletin No. 2.

CATSKILL METAL WORKS

CATSKILL.

NEW YORK

REMOVE BROKEN TAPS

Quickly— Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily-

Tap Extractor and Tap Wrench are only tools needed.

Safely-

Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.

The Walton Co.



spindle thru 4 feed change gears. 9 feeds ranging from .002 to .033" per revolution of the work are available. A set of four speed change gears is furnished. These, in connection with the 2 steps on main drive pulleys, make available different hob speeds between 280 and 950 rpm.

Standard equipment contains a set of 3 change gears for one definite number of teeth on the workpiece. (Change gears for other numbers of teeth can be furnished.) Any number of teeth between 6 and 130 can be hobbed. Also any even number of teeth between 130 and 260. Between 260 and 325 the number of teeth must be divisible by

When hobbing spur gears, differential is locked and out of action, but when hobbing spiral teeth it transmits an additional rotation to work spindle. Each helix angle on work requires a set of 4 helix change gears. The combined action of the index change gear mechanism and the differential mechanism is transmitted to a worm that engages a large diameter worm wheel on work spindle.

A 1-hp motor is mounted inside pedestal and drives machine thru a 2 step belt drive. Provision is made for maintaining constant belt tension. A compact motor pump unit furnishes ample flow of coolant from tank in base.

Taft-Peirce Rotary Surface Grinder

A new 6" rotary surface grinder has been introduced by The Taft-Peirce Mfg. Co., Woonsocket, R. I. Among the exclusive features claimed is a tilting wheelhead which makes the machine suitable for difficult shoulder work. Long life is helped by the hardened and ground ways and the ballbearing travel of saddle and column, said to reduce the difficulties arising from variations of oil film on the ways and minimizing the wear of the saddle and column ways.

It employs a special feature in the mounting of wheel spindle, which swivels in a vertical plane about center of wheel. Spindle is carried in cast-iron block mounted between 2 pairs of circular dovetail slides, permitting swivel-

ing of the entire spindle about the wheel center thru an arc from horizontal to 30° below center.

The ball-bearing, quill-type wheel spindle is driven directly from a 1 hp motor at 3600 rpm. Motor control is provided thru toggle switch mounted on right side of the pedestal below the saddle, which is readily removable.



Magnetic chuck is of special design, with a work-surface 6" in diameter, permitting holding of very small pieces of work at center of face plate.

Handwheel at right operates elevating mechanism by means of a telescoping shaft and gearing to elevating screw which rotates in bronze column nut. The large dial is graduated in half-thousandths with graduations approximately 3/16" apart, for accurate reading and setting, it is said. The entire column which carries spindle travels on ten \%" steel balls retained in 2 pairs of hardened and ground opposed vee ways. Oil is supplied by a one-shot system located in the pedestal.



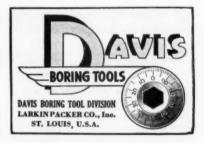
Power Reaming at its best. Saves time and money. Improves your work. Speeds up removal of burrs from tubing as well as from bores after keyseating or drilling of set screw holes. The Catskill also saves on finish reaming, countersinking and counterboring, smoothing off and chamfering sharp edges of round bar stock and many other finishing jobs.

WRITE FOR DETAILS

CATSKILL METAL WORKS

CATSKILL,

NEW YORK



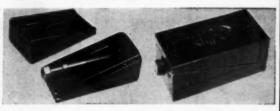
The Chuck operates on 110 v. or 220 v. dc. It has a work surface 6" in diameter. Chuck is 40" above floor. Height under wheel is 12". Work Spindle operates at 120 ppm, driven by a 1/4 hp, 3400 rmp motor (220, 440 or 550 volt, 2 or 3 phase, 50 or 60 cycles).

Total cross travel of saddle is 4". Total travel per revolution of handwheel is 12".

Wheel spindle:—1 hp, 3600 rpm standard spindle, available in 220, 440, or 550 volts vertical travel of wheelhead is 12"; .050" for 2 or 3 phase, 50 or 60 cycle ac. 50-cycle spindles will operate at approximately 3000 rpm. Grinding wheel is 7" diameter, ½" thick; 1¼" hole.

Empco Machine Leveling Jacks

Empco Machine Leveling Jacks were designed by Machine Tool Engineers for accurate and easy level adjustment. They are made by Enterprise Machine Parts Corp., 2729 Jerome Ave., Detroit, Mich.



Consisting of two iron castings and a shouldered screw, the screw head bears against the slotted end of the lower casting and a shoulder ring is machined on the screw shank to ride against inner face of the slotted end.

The screw is threaded into the opposite end of the upper casting and turning causes one section to ride over the other. This movement, coupled with the inclined plane principle, raises or lowers base of the machine placed upon the Jacks.

Empco Jacks are said to eliminate cement bases and floor bolts, since a set of Jacks will be ample support for most machines.

The entire operation of setting up machines and maintaining them level is greatly simplified. Placing a level gage on machine and applying a wrench to the "hex" screw heads is all there is to it.

Induction Heating Speeds Cap Screws

Substitution of induction heating for quick forging of cap screws is reported to have enabled Allen Mfg. Co., Hart-

Accurate SURFACE PLATES



FOR PROMPT DELIVERY!

Lombard surface plates are made of a high quality close grained, stress annealed semi-steel gray iron, are designed for a minimum flexion with a high degree of precision, and are adapted for use where extreme accuracy is required. Available also with planed and handlapped surfaces.

EXTRA RIGID CONSTRUCTION

Heavy ribbed and three point suspension maintains extreme accuracy indefinitely. Sines from 14*x18* to 48*x96*.



Write For Details and Prices

LOMBARD GOVERNOR CORPORATION

Junkin Safety Guards

Assure:

- Protection
- Increased Production

Safety is assured by the exclusive JUNKIN TRIPLE INTERLOCK which locks presses until hands are



safe. For safety, economy and efficiency equip your presses with Junkin Safety Guards. Recommended for all type inclinable and small presses.

Write for facts and prices

JUNKIN SAFETY APPLIANCE CO., INC.

EASY ... TO STEP UP PRODUCTION!

Modern Motor Drives replacing old line shaft equipment provide efficiency equal to many dollars' worth of new machine tools. Users report savings in time, power, floor space, cost of machine operation.

Modern Motor Drives for lathes, shapers, millers, drill presses, punch presses, grinders and hacksaws. Write for complete information.

MODERN MOTOR DRIVES, INC.





AUTOMATIC DIE HEADS

COLLAPSIBLE

BORING

FRICTION

SPECIAL THREADING MACHINES

The RICKERT-SHAFER Co.

R-S Revolving Type Controlled Die h

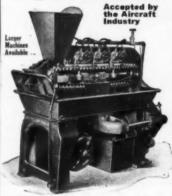
TOOLS



Slots Two Sizes at Once

SPECIAL PURPOSE NUT SLOTTER

- 6 CUTTERS MILLING CONSTANTLY
- 2 CONVEYORS RUNNING CONTINUOUSLY
- · AUTOMATIC INDEXING
- · AUTOMATIC BURR REMOVAL
- AS HIGH AS 3000 SLOTTED NUTS PER HOUR . . . ALL SIZES FROM % to 15/6 HEXAGON ACROSS FLATS



PELLOW MACHINE CO.
13510 Foley Ave., Detroit, Mich.



ford, Conn., to utilize bar stock ½" smaller in diameter than previously used, and to cut the entire screw-making-operation from 90 to 21 seconds. Today, these two savings are of great significance.

The old method involved machining bar stock 4%" long by 1½" in diameter. This was turned down to 1" leaving full diameter for the head. Time consumed was 1½ minutes and much metal was wasted.

With adoption of Ohio Crankshaft's Tocco process of induction heating, the whole operation was changed from machining to quick forging. Bar stock is now 43%" long but only 1" instead of 1½" in diameter, and the new method is 4 times as fast as the old.

Placed in a water-cooled induction coil, the piece is heated for forging in 13 seconds. It is quickly transferred to a nearby heavy-duty forger for upsetting the head. Three blows, taking only 8 seconds, are all that is now necessary to complete the screw.

Control of induction heat to the specified area enables operator of machine to handle the piece free of gloves or awkward tongs. The induction unit,

HOPPERS

THE FASTEST FEEDING HOPPER EVER DESIGNED

Feeds Screws, Screw Blanks, Nuts, Rivets, Pins, Bearing Rollers, Plain Washers, Discs, Bullet Cores, Special Parts.

Hoppers Adaptable To Any Machine.

Send Sample Parts For Feeding Speed.



DETROIT POWER SCREWDRIVER CO. 2809 W. FORT ST., DETROIT, MICH.



THE REED POLICY

of PLANT EXPANSION INCREASED PRODUCTION SUPPLIFICATION OF MODELS

IS AIDING US TO DELIVER MICROMETER

to plants that can furnish preference and mechanics who can fill in our that they are working for coveres

In order to meet the second among thousands of meet the REED factory is temporal devoting its arise adduction to the beginning four models.

Mo. 801 Mo. 901 Mo. 901 Mo. 901 Mo. 901 Mo. 901 Mo. 901 Mo. 902 ph. Mo. 802 ph

SEND IN YOUR ORDER OR WRITE FOR FOLDER

GEO. SCHERR CO., INC. 122 Lafayette St., New York City





Di-Acro Brake No. 1 rapidly forms angles, channels, "Vees". Folding width 6*. Brake No. 2, folding width, 12*. Accurate to .001*.

METAL DUPLICATING

Without Dies



Are you in a rush for some duplicated metal parts? Do you have experimental work? In many cases you can make the parts faster with the "Di-Acro" System, and avoid entirely the expense and delay of making dies. An almost unlimited variety of ork can be rapidly done by the combined use of 3 Di-Acro Precision Units, -Shear, Brake, Bender,

WRITE FOR CATALOG New 32-page catalog "Metal Duplicating Without Dies" gives full details, shows many parts which can be made.

O'NEIL-IRWIN MFG. CO.

314-8th Ave. S...

Minneapolis, Mine

having 2 stations, is powered by a 9600 cycle motor generator set of 60 kw output capacity. It operates on a 440 volt hookup. As in all machines of this type, the heating cycle is governed automatically and operations are push-

button controlled.

Metallurgical examination of the cap screws following forging is said to reveal that, because the grain of the metal follows the contour of the screw, the piece actually has greater strength thru upsetting than possessed by the previously machined screws. Defects are also more readily ascertained when magnified by the increased cross section.

Characteristic of induction heating, scale is either entirely absent or held to a minimum. In the cap screw process, no scale is experienced, thus contributing to longer life of the forging

Variable Voltage Planer Drive

For increasing planer production in industrial plants, variable voltage planer drives with a 30 to 1 speed range

are described in new four-page folder.

Faster planer acceleration and retardation are discussed with a note on accuracy of reversals. Speed range safety, and other features are covered A detailed description of the motor generator set and the planer drive motor covers operation and maintenance factors. Auxiliaries described include field rheostats, limit switches, control panel, and pushbutton station.

Installation photographs show the drive applied to planers doing important wartime jobs. A schematic dia-gram explains how the Rototrol, a regulating generator, controls the variable voltage drive. Elimination of delay due to sequence closing of large accelerating contactors is shown by comparing the rpm-time characteristic curves of constant and variable voltage drives.

A copy of folder B-3064 may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



Here's REAL Conservation . . Why? How? Because ...

when you want to save wear and tear on your small drills - . turn to this dependable supersensitive drilling machine . . . always ready for drilling small holes .004" to.250" diameter

HAMILTON TOOL CO. Ninth and Hanover Streets.

HAMILTON OHIO

The HAMILTON MUEHLMATT DRILLING MACHINE

Dept. B-6

Informative bulletin now ready.

Scrap

The Bullard Co., Bridgeport, Conn. has installed a complete system for converting steel turnings and cast iron borings into material suitable for remelting without high loss.

Material is segregated at each production machine in the plant, by providing selfdumping oil tight boxes. They are colored red, gray, orange, etc., each color indicating a different analysis of scrap such as cast iron, carbon steel, nickel steel: the steel chips are further subdivided according to whether mineral or soluble oil was used.

Material in boxes is taken to chip
department, classified and stored.
Cast iron chips are
briquetted without any preliminary treatment other than screening
to remove refuse.
Steel castings

require crushing before briquetting. If they are machined with mineral cutting oil, extraction of oil is necessary. Mineral oil chips are conveyed to a storage hopper where oil is extracted; then chips are conveyed pneumatically to a compartment of the main storage hopper where balance of chips are kept. This permits independent operation of

Their briquetting plant supplies between 35 and 40% of their foundry material in the form of cast iron and steel.



THE FEDERAL PRESS CO.

As high as 50% briquettes can be used in some heats satisfactorily. Alloy steel scrap thus reclaimed in one year will contain about 35,000 lbs of chromium and 75,000 lbs of nickel.

Other benefits are a readily available supply of scrap for their foundry, large dollar savings due to lower cost of this type of scrap, saving of storage space, and relief of overburdened transportation facilities by using their own scrap.

(From Nickel Cast Iron News)

crusher and extractor.

DESIGNED FOR HEAVY DUTY

THE NILSON FOUR SLIDE MACHINE

For Swaging, Stamping, Piercing,



Blanking, Forming of coiled metal. One of the outstanding features of this combination power press and four slide machine is the powerful and silent action of the mais press slide which is operated by crank motion through toggle or knuckle joints. Strength and rigidity achieved by overhead stay rods. Changing dies is a simple and quick operation as the removable die set is easily accessible. The gripping members are independently operated, insuring a positive pull on long or short lengths direct from the reel.

Write for further information.

The A. H. NILSON Machine Co.

Plastics on Machine Tools

Continuing their progress in plastics moulding, Eclipse Moulded Products Co., Milwaukee, recently adapted several intricate parts used on Gisholt Ram Type Universal Turret Lathes, as shown.

An interesting feature of these new lathes is the new plastic dial and control wheel for the speed selector, used for obtaining any one of 12 available spindle speeds. Operator sets the speed desired on a special dial and machine automatically makes the shift to the correct spindle speed. The combination of dials and hand wheel have now been successfully made of a high impact plastic, instead of the aluminum formerly used.

These new plastic parts are claimed to have several important advantages in machine tool use:—they can be produced faster, and often at less cost, reducing materially the man-hours necessary to produce the finished lathe—a factor of paramount importance in meeting WPB demands for faster production. They aid in the operation of



RUILTFOR SPEED-DURABILITY

THE NILSON-AUTOMATIC METAL AND WIRE FORMING MACHINE

The Nilson Automatic Metal and

Wireforming machine meets today's industrial requirements. Here are some of the features of this machine. Open construc- 1000 tion of press and forming tools. Patented slide feed with an independent cam - operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information.



the machine as well, for the dial numbers on both the inner and outer dials are easier to read. Inner dial is red and outer dial is black which affords a contrast that adds to readability.

Other parts developed for Gisholt include a large 12" plastic hand wheel used for longitudinal positioning of cross slide. As the specific gravity of plastics is about 1/3 less than alumi-num, it was possible for Gisholt Engineers to eliminate the objectionable feature said to be present in wheels of heavier material which caused such wheels to carry beyond a determinal position. Collet chuck guards and various knobs and handles are also of plastic.

College Machine Shop Converted to War Factory

Purdue University's student machine shops at Lafayette, Ind., customarily used for routine practice work re-cently have been converted into a war production factory under terms of a Westinghouse subcontract, according to R. A. McCarty, vice president in charge of the Company's subcontract-

ing program.

More than 275 engineering students enrolled in the shop course are working part-time on the subcontract. Together, their production is the equivalent of a 75-man machine shop working full time on war materials.

At Lafayette, Purdue's president, Edward C. Elliott, announced the University machine shops had been set up on a "strictly production basis," with stu-dents temporarily becoming workmen during the portion of each day they are in the shop, and instructors becoming shop foremen.

Special stock material required for some parts being made by Purdue students has been supplied by Westinghouse. For the purchase of other materials the university has received a priority rating from the War Produc-

tion Board.



CUT COST ON SMALL WORK, SPEED PRODUCTION - IN-CREASE SAFETY BY USING ROUSSELLE PUNCH PRESS.

Tour cost figures will Show that "PRESS TIME" runs high on your larger machines—Especially when producing small parts or in frequent set-ups for light work. Do your small jobs—odd jobs—special work—on a press that is designed and built expressly to save time and money in these operations. Safety devices such as Knockout BAR, the non-repeating clutch are standard equipment on this press without extra cost.

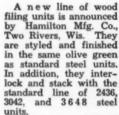
Specifications: Model 10 H, Shown in Cut

SPECIFICATIONS	
Diameter of main bearing and pin	1 1 "x3 1"
Standard stroke	2"
Special stroke (at extra cost) maximum	3"
Top of bolster plate, front to back, right to left	11"x148"
Thickness of bolster plate	14"
Bed to slide, stroke down, adjustment up, (Standard Stroke)	•
Top of bolster plate, stroke down, adjustment up	•
Depth of throat, ram center to frame	5"
Weight of Flywheel	150 lbs.
Speed of Flywheel	200 R.P.M.
Weight complete without skids, (approximately)	975 lbs.
Pressure at bottom of stroke	15 tons
Size of hole in ram for punch shank	1-9/16"
Motor speed and horsepower required	1750-1

IMMEDIATE DELIVERIES-for further information write

CULLMAN HUBER SALES CO. 22-13 Steinway Street Long Island City, N. Y.

Wood Filing Units



They are made in 3 sizes to correspond with

the same sizes in steel units. Each size includes a 5 drawer unit, a flat cap unit, and a 4" flush base. A locking cap prevents unauthorized persons from reaching plans thru top of unit. A flush base furnishes sanitary protection against dirt.

A pantasote dust cover protects plans from dust and minimizes wear. Roller



drawer construction provides for smooth and quiet operation. Safety drawer stop prevents drawer from being accidentally pulled out, but also permits drawer to be removed easily for cleaning. Positive 5 drawer locking device provides simultaneous protection for the contents of all 5 drawers against unauthorized handling.

Conversion

Recently St.
Louis set about to
become a model
for the rest of the
country for speed
in conversion to
w ar production.
Now it is a giant
machine shop at
work on war orders totaling a
billion dollars.

The adaptation of machinery never designed for war production to the output of urgently needed military essentials has been proceeding in an orderly but almost spectacular manner.

For instance, St. Louis had 19 venetian blind manufacturers who would have been forced to close up because of metal shortages for ordinary civilian work. But this suggestion came as the result of a conference with the Contracts Distribution Division of the WPB: "Why not convert from production of

wooden venetian blinds for homes (using a small amount of metal) to steel blinds for industrial plants?"

They were told that there was a strong need for these in coastal plants not only for blacking out plants, but also for protection against flying fragments of glass, bombs, and shells. The metal blinds were ideal for this use, and the St. Louis manufacturers are busy making them instead of being closed down for the duration.

Other problems solved in St. Louis



GITS BROS. MFG. CO.
1860 South Kilbourn Ave. Chicago, III

30 years of oil cup experience

by the DCD included that of the maker of cooking utensils who converted to grenade thrower and small airplane gun mount production. There was also the soda fountain manufacturer who received advice to convert production to percussion primers and shells. A can opener maker now produces shells, a garbage can builder now makes tank mines, and a coat hanger company produces bomb wire assemblies.

(Courtesy Central Mfg. District (Chicago) Magazine).

STOP DUST!

AT ITS SOURCE . . .

DUSTKOP-Low Cost, Portable, Selfcontained dust collecting system complete. Multiple blade fan driven by continuous duty GE motor pulls dustladen air from tool (bench and pedestal). surface and similar grinders, cleans it with low cost, easily renewable spun glass filter. Rapid installation - no sheet metal duct work needed.





DUSTKOP with -Oversize Filter. Prompt
Deliveries
on
High Priorities



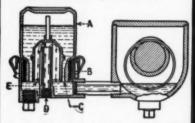
Ask for Bulletin A-500

AGET-DETROIT MFG. CO: 2042 Book Tower

Detroit

Constant Level Lubricator

A new Oil-Rite Constant Level Lubricator holds a visible reserve supply of oil and releases automatically just as much as is needed to maintain a constant predetermined level of lubricant. Its use is said to insure adequate lubrication at all times, prevent oil waste, and the deterioration or spoilage of material caused by oil throw.



It consists of only 3 simple parts. The base is cast of Zamak metal, with an integral open air vent which extends part way up into the oil reservoir. Over this vent is fitted loosely an inverted bucket, or bell, also cast of Zamak metal. The reservoir proper is a glass dome, sealed to a metal collar by plastic porcelain cement. Two spring clips lock the oil reservoir in position. A felt gasket around the outside of the bell seats against the narrower neck of the glass dome when the reservoir is removed, cutting down waste of oil during refilling.

When reservoir, (A), is filled and inverted into position on base (B),



WIREGRIP

Bolt Hooks
Have extra (patented) aligning cards
that hold all hooks in position preventing card end waste—every
hook is used.

hook is used.

STEELGRIP
Flexible Lacing (the type applied with a hammer) in convenient boxes or long lengths with 2-piece hinged rocker pins.

Immediate Delivery on both types.

Write for Circulars

ARMSTRONG-BRAY & CO.

"The Belt Lacing Poople"

5364 Northwest Highway, Chicago

Lewis Semi-Finished 10" SHAPER

Complete with Vise - Prompt Delivery



Perfectly designed, abop tested, trouble-proof construction. Exceptionally efficient. Will stand severest service. Quickly and easily adjusted. LEWIS SHAPER has 10° atroke, 10° long-tudinal feed and revertical feed. Complete — including emi-finished castings, necessary materials, blueprints and LEWIS 7° VISE CASTINGS.

Send today for catalog of Lewis Products with complete specifications . . .

LEWIS MACHINE TOOL COMPANY

P.O. Bax 116. Sta. A. Dent. Z-18

Los Angeles, Cal.



SPECIAL HEAVY DUTY 110 V-220 V-440 V

DEMAGNETIZERS

SIZES UP TO 18'x24'

R. B. ANNIS COMPANY



-ABRASAW-

BRIDGEPORT NO. 47W WET CUT-OFF MACHINE



More, better and cheaper cuts on practically all materials, are produced by the new Bridgeport "Abrasaw". Cutting speeds are unbelievably fast, material is handled with facility and the polished cuts often eliminate secondary operations.

LET US SEND BULLETIN GIVING DETAILS.

BRIDGEPORT SAFETY EMERY WHEEL CO.

1304 W. BROAD ST. INC. BRIDGEPORT, CONN.

lower edge (E) of inverted bucket or bell determines oil level which lubricator will maintain. When level falls below this point, air from vent (D) escapes under side of bell—as at (C) up to top of lubricator, permitting oil to flow down until level to be maintained again seals across base of bell. Operation is entirely automatic.

Lubricators are available in 4 standard sizes, with capacities of 2, 4, 8, and 16 ozs. Outlet tappings are provided at both side and bottom of base, and oil level to be maintained is clearly indicated. Air vent can be provided with filter if desired, or can be installed with breather tube connecting to bearing. Complete details will be furnished by Oil Rite Corp., 3466 S. 13th St., Milwaukee, Wis.

Iron Cement for Patching Concrete Floors

A new product has been developed for quick patching of cracks, ruts, and shallow holes in concrete floors. This product, known as Smooth-On No. 7B Quick Patch Cement, hardens quickly and adheres firmly to the surfaces with which it is in contact.

Like other Smooth-On Cements, the new composition is said to have an iron base, so that it is extremely wear-resistant as well as dust-proof, oil-proof and water-proof. Patches of Smooth-On No. 7B harden over-night, permitting full traffic the following morning, and become stronger with age. Complete information can be obtained by addressing Smooth-On Mfg. Co., Dept. 436, 570 Communipaw Ave., Jersey City, N. J.



METAL - BOND

DIAMOND

PRODUCTION WHEELS and TOOLS
Sturdy - Cool Running

Various Shapes, Types, Sizes

WRITE FOR DETAILS, PRICES READY DELIVERY

MUSTWIN METAL BOND DIAMOND WHEELS AND TOOLS

205 W. WACKER DRIVE, CHICAGO, III.



Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, depend-able... a real time and money-saver.

/INDER

llinstrated is No. 4 Universal with adjusting shaft of % square. Takes wire up to ¼ s diam.

Circular. THE JOHN RLANER CO. Corner Meek & Elm, Sharon, Pa.

Patent No. 2052443

Write for your



Drop Forged Steel

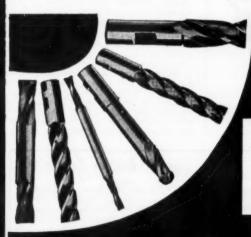
Headquarters for Standardized Die Sets. embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalon.

E. A. BAUMBACH MFG. CO.

1810 So, Kilbourne Ave.

CHICAGO, ILL.



Shear Cut -High Speed

MILLS

Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO. 2345 WOLCOTT ST.,

FERNDALE, MICHIGAN



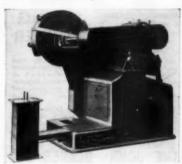


UNIVERSAL HIGH SPEED TOOL CO.

551 W. Washington Blvd. Chicago, Ill.

Downstroke Friction Saws

To meet the demand for high speed friction saws for speed production of bombs, shells and bullets from solid or hollow, hot or cold steel stock, Kling Bros. Engineering Works announce a 36" and 48" downstroke Friction Saw with Hydraulic Feed and main motor sizes of 40 to 75 hp.



High rim speeds, simplicity of saw change, constant parallel plane of saw rotation and elimination of end motion in swing frame are claimed features.

Swing frame is actuated by means of a double-acting hydraulic cylinder thru a 1½ hp motor and pump which is said to deliver oil at constant pressure during the cut, and at low pressure while idling in between cuts. Operating pressure is adjustable to provide the desired operating load on main motor which remains uniform during the entire cut. Rate of downstroke of the

5000 SIZES Files
SHAPES AND SIZES
GROBET Swiss

Ask for Catalog WF.

The most complete catalog of its kind.

Lists 5000 different shapes, sizes and cuts
of GROBET Precision Swiss Files. Ask also
for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability

GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.

saw blade is adjustable up to 2.8" per second while the upstroke is fixed at 4.35" per second.

Saw blade is shielded with a fabricated hood and a cooling system is provided for directing water to dissipate heat from the blade rim. Water and operating controls are located in a pedestal control stand in front of unit to allow clear vision of all operations for operator. Finish pads are provided for receiving suitable holding fixtures for the work to be cut.

Full mechanical details are available in Bulletin X-5161 from Kling Bros. Engineering Works, 1300 N. Kostner Av., Chicago.

Floor Patch

The Rock-Tred Corp. announces heir new Speed Patch for repairing holes, spalls, worn expansion joints, or, as a complete resurfacer of floors.

It is stated that Speed-Patch is a ready-mixed, cold plastic material to be used as taken from the package in a one-minute or less operation. It may be laid during working hours without interrupting plant operations, and is benefited rather than injured by truck traffic while installing, according to the makers. For complete resuracing, Speed-Patch is simply dumped on the floor and rolled out to a smooth, ready-to-use floor, according to the manufacturer.

A new 4-page illustrated folder is available from Rock-Tred Corp., Dept. M, 605 W. Washington Blvd., Chicago.







NEW BRITAIN TOOL & MFG. CO.

GROBET ROTARY FILES ROTARY from the solid ground from the solid

Ask for Catalog WG

the most complete catalog
of its kind, illustrating hundreds of rotary files hand cut,
milled cut, ground from the solid;
also diesinkers' bura.

GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.



Masterdrive for Grinders

A unique drive for Brown & Sharpe and similar surface grinders, announced by the Industrial Equipment Division of Master Electric Co., Dayton, O., is claimed to replace the standard equipment of several idler pulleys and a



floating lever, thereby simplifying and saving time on installation and cutting maintenance. Engineered as a complete unit, it fits over the studs on the base of the machine with no machine work.

According to the makers, a particular advantage is the mounting, which permits the motor to rotate about the fixed base support, with the weight of the motor counter balanced by an adjustable tensioned spring thru a roller chain. Belt tension is maintained in service and in case of belt failure, motor drops slightly to point where increased spring tension supports it.

Localized Hardening Lacquer

The Michigan Chrome & Chemical Co., 6350 E. Jefferson Ave., Detroit, Mich., has recently introduced a specially developed Miccro Supreme Stopoff Lacquer which is claimed to be extremely effective in localized hardening of steel parts. By its use, the usual handling and grinding operations required before heat treating are said to be eliminated.

In customary practice, steel parts which are to be hardened only in certain areas are copper plated completely. From the plating cycle, the parts are trucked to a grinder where the plating is removed from the portions to be hardened.

In the simplified method offered by this new stop-off lacquer, a coating is applied on the areas to be hardened before they are plated. After plating, all that is necessary is to remove the lacquer and the pieces are ready for heat treatment without further preparation.



TAKE DEEPER CUTS AT HIGHER SPEEDS

LIVE CENTERS

IDEAL Live Centers not only permit deeper cuts at higher speed, but can carry heavier loads, because the IDEAL Live Center rotates with the work. Radial load carried by high precision ball bearings; thrust load absorbed by high precision taper roller bearing. All parts hardened and ground.

TRIPLE

Three Interchangeable Center Pieces (illustrated belew) for all kinds of centered and uncentered work. Saveset up time.









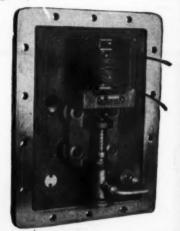
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IDEAL COMMUTATOR DRESSER CO.

1441 Park Ave., Sycamore, Illinois "Sales Offices In All Principal Cities"
In Canada: Irving Smith, Ltd., Montreal, Quebec

Solenoid-Operated Lubricators

In connection with centralized automatic lubricating systems, solenoidoperated lubricators are being used to an increasing degree. When semi-isolated units of a special machine are to be lubricated, a solenoid-operated lubricator in each unit is used frequently.



An application of the solenoid-operated type of automatic lubricator made by Bijur Lubricating Corp., 43-01 22nd St., Long Island City, N. Y. is shown as used in the National Broach & Machine Co's special RMZ Rotomill. In the machining, tractor crank case is mounted in chucks on spindles. Rotating milling cutters advance to work, make plunge cut, and then work begins to rotate on its own centers.

The system is adaptable to any machine layout it is said. Meter-units can be located at any distance, height, or level in relation to lubricator position.

Parts Pans

A pressed steel parts pan has just been developed by A. O. Pfister Co., 947 Woodview Rd., Cleveland Heights, O., and manufactured by the Niles Steel Products, Division of Republic Steel.

Cutting Hobber Production

General Electric recently lopped 3 months off the time previously required to put 96" hobbing machines into operation by sending 6 of its shop mechanics to the machinery firm's plant for an on-the-job study of the equipment's manufacture and assembly.

In previous practice, the hobbing machines, which are used to cut teeth into intermediate gears for merchant marine ship propulsion sets, had been assembled at their point of manufac-ture, tested, and then knocked down

for shipment to the purchaser's plant.

Training the six shopmen in the know-how of this process qualified them to fit, assemble, and test the machines initially in the G-E plant, eliminating the need for the preliminary set-up procedure by the machine-tool manufacturer.

In addition, the 6 mechanics are acting as instructors and passing along their training in the fitting of hobbers to other men in the G-E shop.



Registered U. S. Patent Office

Constructed as per Specifica-tions of U.S. Naval Aircraft Factories.

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and preci-sion filing and sawing is desired. We also manufacture smaller models— Model D-10 Table; Model No. L-12" Table.



HARVEY MANUFACTURING CORP.

161 GRAND ST..

Phone CAnal 6-5170

NEW YORK

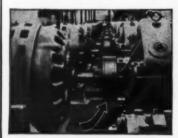


RUSH REPAIR JOBS

The loss you would suffer in output by being forced to shut down a Productive Machine for repairs would probably be greater today than at any time in your historywhy not quard against such shutdowns by using KANTI-LEVER COUPLINGS? They have a Cushion Torque that protects your Productive Machines, your Gears, Motors, Speed Reducers, Bearings, etc. by absorbing the constant vibration and sudden load shocks that cause gradual deterioration and finally shutdowns and rush repairs. They likewise protect you against the evils of shaft misalignment the same as does the ordinary Flexible Coupling. The cut below shows 70 KANTI-LEVERS that have run for 18 years and during that time have paid back their first cost many times over by reduction of repair bills and prevention of shutdowns.

Send for Bulletin 28-B describing

KANTI-LEVER COUPLINGS



BROWN
ENGINEERING CO., 126 N. THIRD SIA

No. 72 Power Squaring Shear

A new Whitney-Jensen No. 72 Power Squaring Shear is announced by Whitney Metal Tool Co., 115 Forbes St., Rockford, Ill. It is made in 36 and 42" cutting lengths, and 14 and 16 gauge capacities.



Clutch is of the plunger pin type triple contact, with heat treated bushing pressed into flywheel to receiverecoil pin wear. Housings are said to be securely doweled to the bed plate Backgage is assembled to crosshead and can be arranged in a parallel position as well as at an angle in relation to shear blades.

Table is cast of semi-steel normalized provided with T slots for holding gage and extended arm supports for holding gages. Holddown is of the spring plunger type. According to the makers, both upper and lower shear blade are held securely to a solid mass of metal, preventing springing. No sescrews are used.

Aiding Metal Cleaning Problem

A brief description of the method used in helping industrial metal clean ing problems is contained in an illus trated leaflet issued by Detroit Re Products Co., 13005 Hillview Av., De troit, Mich. It shows their research engineering and manufacturing facilities for production of degreasers, wash ers and chemical cleaners.

all DOWN - HAND welding with just



Tilted at 1350 (from horizontal) this circular weldment is being rotated at variable speed in a complete circle for downhand welding. With pushbutton control in one hand and rod in the other, this welder has a "productionline" job - faster, safer, better welding on a C-F Positioner. You can speed up your work on one of these machines which handle any size or shape up to 14,000 pounds.

CULLEN-FRIESTEDT

You gain many advantages when you standardize on Duro Slow Speed Drill Presses. Massive construction for extra strength, Balanced and precision made for vibrationless performance. Improved features for easy operation. Highest quality materials for long life.

America is depending on you. Use dependable Duro Presses that will keep your production rolling. Ask for complete details,

DURO METAL PRODUCTS CO.

2649 N. Kildare Dept. BB-29

FOR DURABILITY USE DUROBILT TOOLS



Interchangeable Die for Marking Instrument Dials

Wm. A. Forbes & Co., Inc., 216 Nichols Ave., Brooklyn, have completed an interchangeable die for marking aircraft instrument dials. The new die does a precision numbering job on aluminum, locating the marking exactly, at the rate of approximately 240 pieces per hour which is said to represent an increase in pro-

duction of one hundredfold over en-

The die is designed for present-dayproduction. Interchangeable type provides for replacing single characters or reesetting all characters with ease and speed. Die-holder rings are changeable—the same die may be used to mark the same dial with different spacings.

Pilot pins position the work piece radially and concentrically for accu-

1008

rate location of the impressions. Bearer bars control depth of impression and hardened impression pads provide uniform depth of impression over long periods of use.

The die is assembled in an hydraulic press for clean and uniform impressions without waste of expensive work pieces. The aluminum dials are feed by hand and stacked, before and after marking, with protective spacers between each piece to avoid scratching of bending. Similar dies are adaptable for a wide range of instrument-dial marking.

Cecostamp Catalog

An unusually attractive Bulletin No 276 has been issued by Chambersburg Engineering Co., Chambersburg, Penna describing their Chambersburg Cecostamp. It is a high production impactype stamping machine developed for forming thin hot work, embossing, and producing small quantity, short-runwork.



PROMPT DELIVERIES

GEAR AND BELT

FOR INCREASED PROTECTION IN YOUR SHOP

Gear and Belt Guards of all descriptions Built to Order to your specifications for all types and makes of machine tools. We will be glad to send full particulars.

PENN TOOL & MACHINE COMPANY
100 Pennsylvania Ave. - Corry, Pennsylvania

QUALITY GUARANTEED! WYTO

LINE OF FLEXIBLE SHAFTS, SAWS AND HOLE CUTTERS. SEND FOR COMPLETE CATALOG

WYZENBEEK AND STAFF, INC.

838-844 W. HUBBARD ST., CHICAGO, ILLINOIS

Brooklyn Office 1288 Bedford Ave. Toronto Office Rep. A. Ross Oborne Capitol Bidg.

More Production! with SCHAUER SPEED LATHES



TypeV AIB. A new IDEAL Speed Lathe with infinitely variable spindle speeds for precise finishing.

Faster finishing operations: BURNISH-ING, POLISHING, LAPPING and BURRING of small machined parts used in war equipment. See the new SCHAUER Catalog No. 420 for a variety of Speed Lathes for many purposes. To meet your special or individual requirements, Speed Lathes are designed by our Engineering Department.

"the originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY

2064 READING ROAD

CINCINNATI, OHIO

Machinists-Tool & Die Makers-Sheet Metal Men-Pattern Makers-Get ...

BLUE LAYOU FREE SAMPLE TAMMS

Speeds layout time on brass, Speeds layout time on brass, aluminum, copper, tin, stain-less steel. Won't chip, crack, or flake off. Comes in hand 8 oz. bench type brush-in cans. Also pts., qts., gais., drums. Send for sample now!

Tamms Silica Co. 228 N. LaSalle St., Chicago, Ill.



BIG-HED-NIBS LOC-KEY-SET RE-SET-ABLE Canler dressing Claser telerances Micromotor Accorney ecause: Wing key heat dissipation and absolute dig-

and lock nib.

• Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.).

All diamond sizes \$4 to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6' diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.) Grinders instruction card free.

DIAMOND TOOL COMPANY, Not Inc.

Eve Accident Prevention

Industrial eye accidents during 1941 robbed America of approximately 9,-500,000 man-days, enough working time to have biult 17 destroyers, according to Ira Mosher, vice president of the American Optical Co.

Reporting an increase of 1,000,000 lost man-days during 1941 in comparison with 1940, he declared that 98% of the 300,000 eye injuries which occurred are preventable. The direct and indirect cost of these accidents to the country. he said, totals \$200,000,000,

Stating that the increase in eye accidents is out of proportion to new men employed, he warned that the loss of time and production is materially affecting the war effort.

Most of the human suffering and financial loss resulting from these ac-cidents could be averted, he added, if employers and employees universally adopted proven methods of eye-accident prevention.



INEXPENSIVE MICROMETERS

Sold Under a Money Back Guarantee Complete set \$19.95

Consists of: 0-1* Micrometer, Outside. 1-2* Micrometer, Outside. 2-4* Micrometer, Outside (2 thimbles). 2½-4* Micrometer, Inside (3 measuring rods). Velvet Lined case.

Write for FREE descriptive Folder.

MICRO PRODUCTS CO.

210 JOS. CAMPAU

DETROIT, MICHIGAN

IMPROVED! Mastercraft Turret Tool Post



Always A Superior Tool ... Now Greatly Improved

Faster action for top production— Hardened throughout, for longer service—Self compensating for wear in hard use—Precision built for accuracy.

accuracy.

The new Mastercraft Turret is a fast indexing 4-way tool post for repeat operations on the engine lathe or for front cross slide on the screw machine. Especially designed for use on 9" and 10" South Bend Lathes, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.

Order through your jobber or write for literature.

WASTER (RAFT TOOLS

F & M SALES CO. Hollywood, California



With every man and machine producing at top speed to help America fight on the land, in the air and on the sea, we strive to hasten the day of Victory.

SPECIAL BOLTS, NUTS and STUDS
DIE SINKING and DROP FORGINGS
SCREW MACHINE PRODUCTS • HEAT TREATING
SPRAYED METAL EQUIPMENT

Estimates sladly submitted. Send samples or blueprints. Catalog on request.

RHODE ISLAND TOOL CO.

148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO



"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES—Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

SWIVEL VISES—Jaw dimensions: width 4", depth 1½", maximum opening 3". Can be used without base.

Write for folders.

MANUFACTURERS OF PRECISION HIGH SPEED STEEL AND CARBIDE CUTTING TOOLS.

MODERN TOOLS

De Luxe Acousti-Booth

A new wooden Acousti-Booth, finished in attractive walnut color, is annuonced by Burgess Battery Co., Acoustic Division, 2817D W. Roscoe St., Chicago, Ill. This new booth is part of the line of wooden booths being developed to enable the company to supply industrial users without priorities or other restrictions.

Walls and ceilings in the new Model 210 are constructed of heavy reinforced birch plywood panels, filled with a thick blanket of sound - absorbent material. Inside walls consist of a heavy perforated plywood facing, which protects the sound - absorbent material.

Like other Acousti-Booths, it has no doors because it needs none. Factory

racket is absorbed so completely by the lining of the booth that telephone calls can be made without interference, even under severe noise conditions.

The open, doorless construction allows ample ventilation. Maintenance is practically eliminated, because there are no locks, hinges, or other mechanical parts.

The Model 210 is supplied attractively finished in walnut, with light wood interior. It may also be obtained unfinished to permit finishing to suit your requirements. A shelf is provided for the telephone instrument and for taking notes. Overhead electric light fixture with pull-chain provides ample illumination. Outside dimensions are 30" wide by 79½" high by 38" deep. Front opening is 24" wide. Approximate shipping weight is 225 lbs.

Eye Safety Catalog

A 112 page safety equipment catalog
has been issued by American Optical
Co., Southbridge, Mass. In addition to
standard eye protection equipment, the
catalog includes welding helmets, first
aid kits, respirators, and safety clothing.

284



You'll Get a Good Deal From Anderson's Balancing Ways — They're Tops in Accuracy.

All shops handling rotating parts can profit by using this simple, sturdy and thoroughly dependable device for balancing, straightening and truing operations. It assures better work in less time and with less labor.



Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

ANDERSON BROS. MFG. CO., 1907 KISHWAUKEE ST., ROCKFORD, ILL.

GRIND YOUR OWN KNIVES

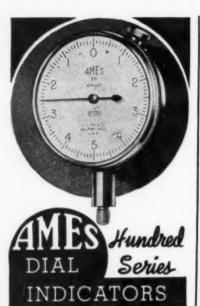
with this PRECISION Knife Grinder

TYPE B26 - 60

Grinds knives edge up or down; flat or concave bevel. Heavy boxtype bed provides stabilized rigidity. 5 sizes; 26 to 60 to ther types for all lengths of knives,—straight or circular. Write for circular on B26-60.







Made to American Gage Design specifications in four sizes with fourteen different dial numberings indicating thousandths, half and tenths of thousandths inches. Plain or jewel bearings. Shock absorbers for all models.

Send for new catalog No. 52

B. C. AMES CO.

Offset Rivet Sets

Designed with angular offsets of 7½°, 10°, and 15°, a new line of offset rivet sets has just been announced by the Aero Tool Co., Burbank, Calif.



Incorporated in the manufacturing is a process known as Micro-glass polishing, which is said to develop a glasssmooth face that will not harm aircraft skins or other surfaces the tools contact.

Also, incorporated in the manufacture is the Aero Tool Cup-forging process which is claimed to assure an even metal flow and structure for long wear and precision.

Curran Announces Degreaser Solvent

A new mineral grease and dirt digestive solvent called Gunk X-11, is available in the form of a concentrate. It may be diluted with a grease solvent before use to charge large open cleaning tanks or vats.

It is claimed particularly effective in heavy duty automotive or similar applications where there is much insoluble dirt or smut. The marketing of the product is announced at a time when there are far-reaching shortages of all chlorinated solvents.

This new cleaning method is carried out by cold immersion of greasy or dirty parts. The new solvent is said to take the cling out of hard mineral dirt and grease accretion, and emulsifies them as well, so they may be rinsed away by sluicing with a water hose.

The removed oil and dirt disappears in the form of a milky oil-in-water emulsion which does not clog sewer drains, or present a fire hazard.

SAVE SKILLED LABOR AND PRECIOUS TIME WITH THIS HIGHLY EFFICIENT PRECISION DRILL GRINDER



BLACK DIAMOND

FOR SMALL GAUGE AND FRACTIONAL DRILLS

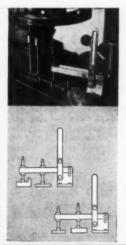
Hundreds of War Production plants are saving valuable time and skilled labor costs by using Black Diamond Drill Grinders for sharpening small gauge and fractional drills.

On a Black Diamond, without mechanical skill or knowledge, anyone can produce quantities of perfectly sharpened drills with lips of uniform length, correct angle and clearance, to speed production—save expensive drill stock—reduce drill breakage and release skilled labor for more important work, install a Bench or Pedestal type Black Diamond Drill Grinder at once.

The Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crank shaft points.

Write at once for more complete details.

BLACK DIAMOND SAW & MACHINE WORKS, INC.



Simultaneous Clamping

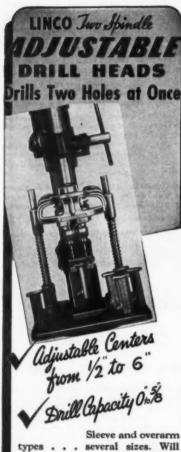
AT MORE THAN ONE POINT

One clamping operation can now hold several pieces at one time regardless of thickness or shape. A new model Knu-Vise Toggle-Action Clamp (No. KV-195) makes this possible. Its U-shaped toggle arm permits the quick insertion and adjustment—horizontally or vertically—of pressure pads at one or more points. The same setup remains uniformly fixed for entire job. Many motions are thus eliminated, and much time is saved. One flip of lever either clamps or releases. Applied pressure ratio is in excess of 40 to 1.

If you have any clamping operations, perhaps we can show you some short-cuts to save time and speed production.

KNU-VISE

206 GROVE AVE., HIGHLAND PARK, MICH. 3228 SAN FERNANDO RD., GLENDALE, CALIF.



double production of any single spindle drill press. Quickly adjusted to any desired drill centers from ½" to 6".

Send for descriptive bulletin.

LINDERME MACHINE & TOOL CO., INC.
12253 COYLE AVE., DETROIT, MICH.

Welding Gun Attachments for Balancing Machines



Development of welding gun attachments for balancing machines by Progressive Welder Co., 3017 E. Outer Drive, Detroit is said to have eliminated the necessity of "balance-machining" of rotating parts on which accurate dynamic balance is required—also making unnecessary leaving of excess stock on parts for this purpose.

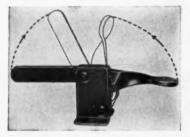
The gun shown is fitted with a bracket which hooks over the ring gear of a hydraulic coupling. The gun is swung over and a balancing lug of the correct weight needed is spot-welded to the housing. The gun is hydraulic in operation.

Flexible Shaft Bulletins

Stow Mfg. Co., 30 Shear St., Binghamton, N. Y. has just issued 2 bulletins concerning their flexible shaft drill extensions. Thru their use, power drills can be used with one hand to reach the most awkward places. They are available with 45 and 90° angle heads.

Small Aircraft Clamp

A small size, horizontal type toggle clamp has been developed by Detroit Stamping Co., 347 Midland Av., Detroit, Mich. to meet aircraft demands. It is known as De-Sta-Co Toggle Clamp No. 205.



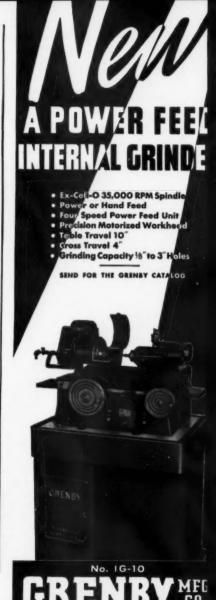
When in locked position, clamp measures only 1 9/16" high and 5\(^{\mu}_{1}\) from tip of handle to tip of arm. Weight is only 3\(^{\mu}_{2}\) oz. Handle and arm are in horizontal position when clamp is locked, thus providing clear working space from above.

It is claimed that, altho small in size, clamp design and type pivot pins used prevent any undue looseness of parts. Structure is claimed to be rigid, yet clamp is free and easy acting.

Industrial Brush Catalog

Catalog K-15 of Keystone carbon, graphite, and metal-graphite brushes has just been issued by the Keystone Carbon Co., Inc., 1935 State St. Saint Marys, Pa. Popular types of Keystone metal-graphite brushes for low voltage generators and slip ring applications, and carbon-graphite brushes, for motors and generators, are illustrated. Also shown are fractional horsepower and automotive brushes, as well as metal-graphite and carbon contacts, negative temperature coefficient resistors, and Selflube porous bronze and porous iron bearings.

The new catalog contains base prices of standard sizes of brushes and gives a simple method for computing prices for each style.



PLAINVILLE. CONNECTICUT

OPTICAL COMPARATORS

MILLING MACHINES

ROTARY SURFACE GRINDERS

PORTMAN MACHINE TOOL CO.

FRICTION
ADJUSTMENTS
MOVING PARTS
PRASILE MECHANISMS
Considerated for constitute to the constitute of the constitute of

Non-Scratching Mallet

A new pyralin plastic tipped mallet that is claimed not to mar metal or plated finishes is announced by Southwest Mfg. Co., 1623 E. 1st St., Santa Ana, Calif. Heads are threaded, and

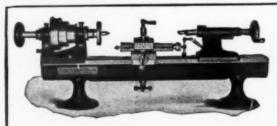


replaceable by hand. Balance of head is of solid brass with an oval hole drilled, so handle cannot turn or come out.

This shock proof mallet takes the place of rawhide, wood, and copper mallets, and is finding wide use in aircraft and other war industries in which non-scratching mallets are needed.

"Compo" Bearing Bulletin

A bulletin of installation data on "Compo" Oil - Retaining Bearings, in standard 8½x11" size, is offered by Bound Brook Oil - Less Bearing Co., Bound Brook, N. J. It shows most approved methods of installation with diagrammatic drawings and details of burnishing and boring tools; essential information on eliminating reaming and machinery. The adaptation of this type of bearing to moulded rubber, plastics and die castings is also detailed, together with graphs reflecting essential data on shaft clearances and permissible loads.



WADE Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co. Waltham, Mass.

Three New Shop Books

American Technical Society, 58th at Drexel Ave., Chicago has just issued 3 new shop books. The first is a 111 page book costing \$1.25, dealing with 28 jobs on Grinding. It covers jobs on the inspection, care and use of the cylindrical, surface, tool and cutter grinding machines: the use of precision and semi-precision measuring tools and devices in performing grinding jobs. Students are taught the important features of grinding, lapping, measuring, gaging, and hand honing operations.

Another new book is on Bench Work. 155 pages, covering 34 typical jobs, costing \$1.35. It aims to teach bench and floor work including selection, preparation, and laying out steel stock and castings, measuring and gaging, fitting, adjusting and machine repair. It explains the proper use of the machinist's hammer, hacksaw, files, scraper, taps, dies, and reamers, as well as fine or precision tools for laying out, locating, measuring, and gaging, such as calipers, dividers, micrometers, and combination square and surface gages.

The final new book is a 40-page instructor's guide at 75c. This gives de-tailed information for instructors who are using the units for lathe, drill press. milling machine, grinder, shaper and planer, and bench work.

All these books are written by the staff of Dunwoody Industrial Institute, and all problems have been "tested-on-There is a job instruction sheet for each job plus questions for each job, a job check sheet, hints for blueprint reading, etc.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

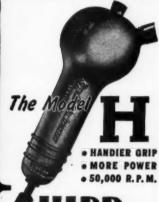


Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S .- Inexpensivelast for years.

Write for Circular NIELSEN TOOL & DIE COMPANY 1859 Gardner Ave. Berkley, Mich.

Youll llgree! BEST ALL AROUND

OFF-HAND GRINDER OUR TOOL-MAKERS EVER USED"



Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the prac-tical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. If you are doing priority work...

Please attach preference rating certificate with order.

MADISON-KIPP CORP. 207 WAUBESA STREET

MADISON, WIS., U. S. A.



Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

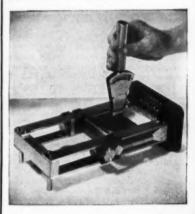
TRIAL ASSORTMENT—enough for average use on one machine sent for \$1.00. Give arbor size.

Size and price list sent FREE!

DETROIT STAMPING CO.

Ellstrom Internal Setting Gage

An Internal Setting Gage has been developed by Elmer Ellstrom of the Dearborn Gage Co., 22033 Beech St. Dearborn, Mich., to eliminate the old conventional method of setting instruments and gages, using clamps and parallels with gage blocks. Its gaging surfaces are processed and finished to millionths in flatness, thereby permitting quick checking with a minimum of adjustment, it is claimed.



For example, if the gage is adjusted for 2" reading and a 1.875" reading is desired, it isn't necessary to make a readjustment; all that is required is to wring a 1.25" gage block on the bottom surface of the gage, immediately giving a 1.875" check.

Another feature of the Ellstrom gage is that it can be used either vertically or horizontally to facilitate adjustments.

The gage illustrated will cover readings up to 6" and models can be made to take care of any specific job within a reasonable range. It is simply and quickly adjusted by two thumb screws on each riser. Its base is 4" x 6½" and overall height is 12".

Buy a share in America with United States War Savings Bonds and Stamps

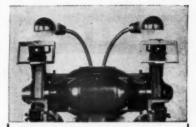
THE MIDGET



HALF

We can supply this Indicator with or without lug on back. Also with support arm for mounting on surface gage. Light weight makes it ideal for use with magnetic base.

Waltham Dial Gage Co



Reduce Eye Strain ... PRODUCE MORE!

Avoid precious hours lost . . . costly slow-downs . . . unnecessary spoilage . . . all due to eye fatigue. VIMCOLIGHT your machines as Cincinnati Electric Tool Co. have lighted this grinder. Flexible; non-glare; designed by industrial lighting specialists.

VIMCOLIGHT

VIMCO MANUFACTURING CO.



Sellers

t Production Needs The Ground Tools! Grind them on a

SELLERS TOOL GRINDER!

More vital than ever before is the need for correctly ground tools and tool bits-for it is only when tools are properly shaped and have the right clearance and rake that they can take heavier cuts at higher speeds for fast production work. Sellers Tool Grinders provide a simple and efficient means of accurately producing correct tool shapes and of duplicating these shapes on any number of tools.

To keep in step with today's production demands, you need a Seilers Tool Grinder in your plant.

> Write for the new Sellers 4-T Tool Grinder Bulletin.



WM.SELLERS&CO., INCORPORATED 1616 Hamilton St., Philadelphia, Pa.

Duro Punch Presses

Equipped with bronze bearings at all wear points for long life at top production speeds, a new line of punch presses is offered by Duro Mfg. Co., 800 E. 61st St., Los Angeles,



Available in 1 and 4 ton models, these presses have, according to the manufacturer, many features ordinarily confined to the heaviest presses. Said to be an exclusive feature is the heat treated alloy steel driving shaft which is absolutely straight, and same size thruout, without eccentric, overcoming danger of shearing or twisting. Directional change or punch force is transmitted by an unique eccentric press fit onto the driving shaft and held securely by keys. Eccentric operates in heavy bronze bearing.

The ram or punch rides in semisteel guides, slotted for lubricant distribution and adjustable for wear.

4-ton press weighs 185 lbs, is 12" wide, 25" high, and 15" deep. Accommodates dies up to 43/4". Stroke standard is 1".

1-ton press weighs 60 lbs, is 8" wide, 17" high, and 10" deep. Takes dies up to 3-34". Stroke standard is 34".

WOOD stages amazing come back

WOODWORKING DIGEST Keeps ahead of the Parade

WOOD-WORKIN

"WOODWORKING DIGEST" is the
new name for the improved
A3-year old Woodworking
Machinery magazine which is
broadening its scope and expanding its editorial services and
coverage to keep pace with the
tempo of woodworking developments in these critical times.
Weite for a wells-all decatar.

The emergency has returned wood to scores of its former uses. And more important!...The versatile new adhesives which make possible an endless variety of plastic-bonded ply woods, plastic laminated woods and compregnated woods have enabled wood to assume an important part in our war effort.

In the forefront of this parade marches WOODWORKING DIGEST—the new name for the 43-year old Woodworking Machinery magazine. The editorial content now covers the entire field—both old and new aspects, presented in Digest form for today's busy executives. The circulation has likewise been greatly expanded.

Write for "tells-all" circular.

HITCHCOCK PUBLISHING CO.

508 South Dearborn Street - Chicago, Illinois Publishers of The Machine Tool Blue Book

PRECISION TAPPING MACHINE NEW-DIFFERENT



Taps guided by precision leads—Leads furnished for any screw pitch, right or left hand threads. Capacity 36° including 36° pipe threads—Four speeds from 95 - 395 RPM. Equipped with dial indicator for bottom tapping. Ball bearings used throughout. Floor stand with coolant system available. Present users have speeded up their production considerably. Quick Delivery.

POSITIVE OFFSET BORING HEAD



Employs no dial—Measurements are taken across two hardened buttons, eliminating all chance of error, Capacity upto 15°. O.D. Dia. 4-7/16° over-all length without shank 3-11/16°—Boring bar hole 1°. Shank

sizes B&S No. 9, 10, 11, 12, Morse No. 4 and 5.

Immediate Delivery—Satisfaction guaranteed

Pacific Tool & Supply Co.

342 No. Vermont Ave.

Los Angeles, California

Fix Floors While Traffic Rolls

In the face of oncoming traffic, it is now possible to patch or overlay a rutted floor and truck over it immediately. No 12 to 30 hour delay. This new, ready-to-use material called "Instant-Use Resurfacer" is an answer to repair problems in plants maintaining full time production. It is said to improve in smoothness and compact under the wheels of constant traffic—adheres to old concrete or wood—bonds to a feather-edge—makes trucks start easily after standing. Address Flexrock Co., 2336 Manning St., Philadelphia, Pa.



Union Twist Drill Catalog

A handsome 327 page catalog N beautifully bound, has been issued by Union Twist Drill Co., Athol, Mass. In addition to the usual price lists and specifications, there is much valuable engineering information, as well as tables, etc.

Subjects discussed include: — proper use of milling cutters, tables of cutting speeds, history of cutters for cutting teeth of gears, drawings of comparative curves of involute tooth shapes, tables on sizing and cutting of gears, drawings of comparative sizes of gear teeth, cutters for mitre and bevel gears including tables.

There is also material on hobs and their uses, shaped profile and formed cutters for the production of duplicate parts, sharpening cutters and twist drills, hardness conversion table, table of decimal equivalents and weights, etc.

DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX Steel Slide VISES



A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio

Unskilled Labor can give you high tapping production on this Etter-Emrick

FOOT-OPERATED TAPPING

The skill required in tapping has been built into the machine. All the operator has to do is place the work and step on the foot pedalwhich he can do fast and with little effort because both hands are free and the pedal is sensitively counterbalanced. With the standard 2-spindle head illustrated, 2400 accurately tapped holes per hour is easy. With available Ettco-Emrick Multiple Tapping Heads, production can be raised up to 12,000 holes per hour.

GET FULL DETAILS ON THESE BULLETINS

BULLETIN No. 4 covers the Tapping Machine and BULLETIN No. 3 tells all about the Multiple Tapping Heads.

Write for copies today.

ETTCO 596 Johnson Ave., Brooklyn, N. Y. CHICAGO



MILE DRILL CHUCKS . TAP CHUCKS . TAPPING ATTACHMENTS MULTIPLE TAPPING AND DRILLING HEADS . TAPPING MACHINES

Is Coolant Circulation Slowing Down Your Production?

The output of the finest machine is limited by the proper flow of cutting oils and coolants. There is an Eastern Coolant Pump model which will assure proper coolant handling for any requirement, at any rate of flow, any head and discharge.



EASTERN ENGINEERING COMPANY

42 Fox St., New Haven, Conn.

Kennametal Tool Manual

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., announces a new 48-page "Kennametal Vest Pocket Manual."



Small in size, so that it can be easily carried in the pocket for ready reference, the new Manual contains chapters on Selecting, Designing, Using, Brazing and Grinding Kennametal tools. Complete easy - to - follow instructions show readers exactly how to get the utmost in service from all types of steel-cutting carbide tools. The manual is further clarified by more than 100 illustrations.

Movies for Production Training

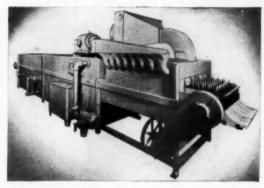
Emerson Yorke Studio, 130 W. 46th St., New York City, has completed eight reels on the Technical Training for the War Program of the U. S. Office of Education, Federal Security Agency, Washington, D. C. These sound films on essential machine shop practice were produced in war plants in the East and include 3 subjects on operations on the Shaper: "Cutting a Keyway on End of a Finished Shaft," "Machining a Cast Iron Rectangular Block," and "Machining a Tool Steel V Block," and 2 on operations on a Radial Drill Press "Drilling and Tapping Cast Steel" and "Drilling to a Layout and Spotfacing Cast Iron."

The slow, costly method of "dunking" shells in tanks of boiling solution by means of racks, lowering them into rinse tanks, then placing them over a drain section and blowing off the excess moisture by means of compressed air, has now been speeded up by this new - type Product Washing Machine designed and built by The Alvey-Ferguson Co., 777 E. Disney St., Cincinnati, O.

Especially designed to

remove grease and chips, and dry 20 mm., 37 mm., or 40 mm. shells, this A-F Machine is a valuable part of the production line. The automatic ejection of the shells is another feature.

This and other new-type A-F machines for washing, rinsing and drying



shells, shell fuses, cartridges, bombs, machine gun barrels, rifle parts, cartridge links and other metal armament products are described in a new Victory Folder entitled "Yes! All Metal War Products Must Be Cleaned." A copy of this folder is available from the makers.

DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.

"TRU-V" BLOCKS

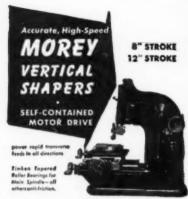


Why Not Save Time—by having enough V-Biocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10⁵, in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

Let us send descriptive bulletin. Or contact your mill supply dealer,

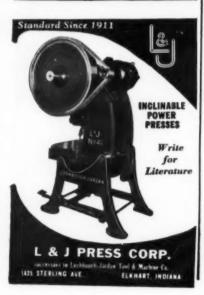
Oliver Motorcraft Corp. 2532 S. Wabash Ave., Chicago, III.



Built to highest accuracy standards the MOREY VERTICAL SMAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.

Ask for Circular 726

MOREY MACHINERY CO., INC. 410 Broome Street New York, N. Y.



Moisture Prevention Cabinet

Tools, dies and gages can now be protected against the effects of excess moisture by a new cabinet type dehumidifier made by General Air Conditioning Corp., 4428 Appleton St., Cincinnati, O. The "Dry-Cabinet" is said to keep air dry, clean and wholesome, prevent mold, mildew and dampness and reduce their attendant odors.



The excess moisture is absorbed from air by the Water-Sorber dehydrating, chemical cubes. Circulation of dry air thruout the cabinet is provided by a flue that runs up both sides to the top of the chemical unit. Built to provide ample and convenient storage space, the cabinet is of wood, 34" high, 38" wide and 14" deep.

Also available, are Water-Sorber units, in several sizes and models, for use in spaces and buildings where infiltration is at a minimum.

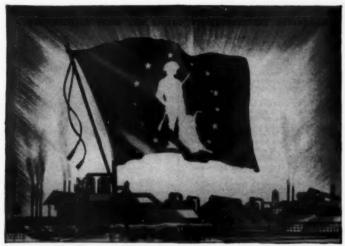


Anyone can do expert drill grinding with this simpleto-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for FREE literature.

72



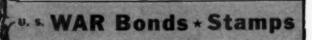
Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 percent or More Employee Participation in the Pay-Roll Savings Plan

T doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts: To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into U. S. Savings Bonds regularly, every pay day, with the goal being 10 percent of the gross pay roll allotted to Bonds. You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify. For facts about the Pay-Roll Savings Plan, write Treasury Department, Section D, 709 12th Street, NW., Washington, D. C.





This Space is a Contribution to Victory by Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, III.

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Sipa

POWDERED DIAMONDS

FOR FAST

Cutting • Lapping • Polishing

MADE... Only of selected hard tough African and Brazilian diamonds crushed to produce maximum abrasive qualities of uniform strength.

212ED... Scientifically in ten standard sizes to meet general requirements — or meshed exactly to individual specifications.

FURNISHED... In dry powder form — or in compound form in which the diamond powder is combined with lubricants or cutting oils.

Guaranteed-weight-quality-purity.

Lowest prices - and immediate delivery of any quantity.

Send for data on diamond powder, for cutting, lapping and polishing.

J. L. HANIFEN

Diamonds for Industrial Use 410 EAST 57th ST., NEW YORK, N.Y.

FELL PRECISION



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005* per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sires—5½%212°, 3½%20°.

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY 700 South St. Rockford, III.

Elastic Stop Gang Channel Nuts

Elastic Stop gang channel nuts, widely applied in the aircraft industry, are now offered by the Elastic Stop Nut Corp., 2332 Vauxhall Road, Union, N. J., for testing on the many applications in general industry where multiple, self-locking, bolted fastenings are required.



The strips are factory-assembled, and it is necessary only to rivet or otherwise fasten them to the structure where they are to be used. They consist of specially designed Elastic Stop Nuts, with 4 lugs at the base and installed at specified intervals in a metal channel strip which is preformed to accommodate the nut lugs under longitudinal flanges. The channel strip is pierced for the required nut size and spacing, and nuts are held in place by dimples in the channel, tolerances permitting them to be virtually self-centering.

Altho gang channel nuts are permanently mounted to the structure, it is possible to remove or replace individual nuts should this be necessary because of damage in application or in use. A nut may be easily removed from the channel by inserting a thin screwdriver between the flange and the nut and drawing it sharply toward the flange. The nut will snap out of the channel.

Coolant Sanitation

Coolants are good breeding places for bacteria, and skin diseases and other dermatitis are quite common among those working with it. A handy booklet Cutting Oil Sanitation has been issued by C. B. Dolge Co., Westport, Conn., which goes into this problem thoroly, and describes their Steridol remedy.

BUY THEM

For metal cutting results that satisfy. There is a LENOX Distributor near you.

AMERICAN SAW & MFG. CO. SPRINGFIELD, MASS



"The Blade in the Plaid Box"

Ammunition Cleaning

While the urgent demand for great quantities of ammunition has made mass production techniques essential in the manufacture of small arms ammunition of the .30 and .50 calibre as well as 20 mm. and 37 mm. sizes, precision requirements of the highest order are nevertheless rigidly adhered to. The considerable number of cleaning operations required in small arms ammunition production, therefore, must be completely dependable and definitely standardized, it is pointed out in a 4 page article appearing in the MarchApril issue of Oakite News Service.

Complete with flow sheets and diagrams, the article states that the large number of relatively small parts which must be handled, make it important that the cleaning equipment used assure a smooth flow of work with minimum handling. A drum-type washer, providing a tumble-wash followed by a spray-wash and using an alkaline material is described in detail. Requirements which must be met by the cleaning material selected are given.

Additional factors such as correct timing during washing operations and the choice of an easy-to-remove, uniformly mixed compound in previous drawing operations are also given consideration.

Also of interest is an article describing the Bullard-Dunn Process as applied to wartime production. After a discussion of the nature of the operation, certain facts concerning alkaline pre-cleaning and its importance in securing maximum efficiency are given. Also included is a listing of the many applications of the process.

Copies are available from Oakite Products, Inc., 57 Thames St., New York, N. Y.

Spray Booth Cleaning Compounds

Triad WS and WSF spray booth cleaners for use respectively in booths where oil base paints and enamels are sprayed, are described in a new leaf-let issued by Detroit Rex Products Co., 13005 Hillview Av., Detroit, Mich. It tells how vital parts of spray booths may be kept from becoming fouled by paint pigments.



BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE
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S & S MACHINE WORKS

4539 WEST LAKE STREET

CHICAGO, ILLINOIS



SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 151/2 by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.

War Production Data

Methods developed by many armament manufacturers for the purpose of elimination of production procedure bottlenecks, particularly in the processing of smaller but vitally essential parts such as cartridge links for machine-gun ammunition belts, are described in interesting detail in the 40-page fifth edition of "War Production Data from The Houghton Line," which is just being distributed.

Other subjects discussed in the publication, all of which are treated from the viewpoint of manufacturers whose experience formerly was limited largely to peacetime production of non-military goods, include "Heat Treatment of Gun Tubes," "Honing Practice in Gun Making" and "Point Detonating Fuse Machining." All of the articles are illustrated.

Copies of "War Production Data" will be sent without cost on application to E. F. Houghton & Co., manufacturers of heat treating and metal - working products, 303 West Lehigh Ave., Philadelphia. Pa.





CUTS—Wire and rods up to % in. CLIPS—Band iron up to $1\!\!/_{\!\! 8}$ x 2 in. MEASURES—Length of pieces.

The lowest-priced wire and band cutter on the market. Every shop, big or small can use a WONDER CUTTER.

Write today for further information and prices.

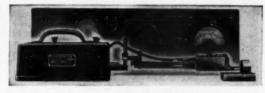
The Federal Foundry Supply Co. 4602 East 71st St., Cleveland, Ohio





New Profilometer Accessory

A newly designed Mototrace, an accessory used with the Profilometer for mechanical tracing of surface finish, has been announced by the Physicists Research Co., 343 S. Main St., Ann Arbor, Mich.



The new Mototrace, designated as the type "V", offers a number of new features. A 9-watt driving motor is provided which itself is reversed. With this design, a length of stroke from 1/32" to 23/4" can be obtained. A long available trace, allowing continuously adjustable setting is claimed to be a feature.

Provisions have been made so that, if the motor should become locked, it does not heat up and the motor is not damaged. The new Mototrace is shown in use with the Type I (internal) Tracer and Profilometer. All opera-

tions are controlled by the power switch and 2 adjustable stops.

The Mototrace, one of the most important Profilometer accessories, is claimed to be valuable for securing accurate readings on very fine surfaces, By its use, the Profilometer tracer is drawn without vibration across the piece being measured. It is also useful for measuring softer materials, awkward shapes, distances as short as 1/32" and surfaces such as those in small holes, adjacent to shoulders or bosses, and on gear and hob teeth.



THERMON 7" ROTARY TABLE



Precision ground top and bottom - Substantially ribbed. 4 table quadrants calibrated 0 to 90° each. Friction loaded worm dial gradvated in 240 minutes. Overall height only 21/4". Write for folder!

AACHINERY MANUFACTURING COMPANY HORIZONTAL MILLS, VERTICAL MIL



BROTHERS

GRAFTON WISCONSIN

New Clamps

A new highstrength C clamp claimed to have a breaking point of 7800 lbs is now being manufactured by Products Engineering Co., 700 E. Florence Av., Los Angeles, Calif.

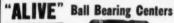
These clamps were developed particularly for the U. S. Air cations GGGC406.

Corps and exceed all Federal specifi-

This clamping strength, which is far in excess of the 4500 lbs breaking point included in the above specifications, is achieved by a 100% drop-forged manufacturing process, including complete heat treatment of all parts. Screw is square-head type.

These C clamps are available immediately in 11/4" size, and other sizes can

be made.





"They turn with the work" Write TODAY - and let us tell you more about them. MODERN MACHINE CORP.

0 LOW E ROTARY POWER CUTTERS ٧ E "Ground from the Solid after Hardening" E R DESIGNED AND SERVICED BY M SEVERANCE TOOL COMPANY 8 1510 East Genesee Avenue

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G R П N D SAGINAW, MICHIGAN

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Brooklyn, N. Y.

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FOR DEFENSE

KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

DIAMOND POINTED EMERY WHEEL DRESSERS

IMMEDIATE SHIPMENT

Send for Prices Specify Holder
"If its made of Diamond—Ask us First."

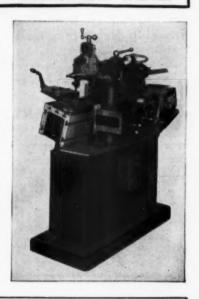
E. KARELSEN, INC. 56 W. 45th St., New York, N. Y. Tel. VAN. 6-5688

Hy-Duty Shaper

The Sales Service and Mfg. Co., 473 N. Cleveland Av., St. Paul, Minn., announces the 8" Hy-Duty Shape-Rite Shaper which can now be obtained with a swivel table.

With the swivel table and the extra travel of the tool head which is furnished on the Hy-Duty Shape - Rite Shaper it is more helpful in manufacturing gun parts and instruments.

Swivel table is mounted on a special heavy-duty cross rail saddle and a graduated to a total of 180° or 90° at either angle and can be set to any desired angle. All gears are mounted on anti-friction bearings and are lubricated with a special developed lubrication system from the outside of the shaper. All of the gears are helical angle, stub toothed to insure smooth running and to eliminate tool marks it is said.





Why Not Buy The Original Electric Etcher MARK IRON AND STEEL THE ETCHOGRAPH WAY

New ELKONITE TIP pencil. New Baby Grand Model at a lower price.

BREWSTER - SQUIRES CO.
42 Church St., New York, N. Y.

2,000



DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

(În Canada: 444 Pacific Ave., Toronto, Ont.)

MILLING - DRILLING - BORING ATTACHMENT



Uses many types of cutters on a wide range of work. 1/16* to % end mills.

FEATURES
Large size spindle
withNo.9 B&S Taper.
Large Quill Diameter with a travel of
4°. Furnished with

½ h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes 1/16° to ¾° end

mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

PROMPT DELIVERY

Send for Descriptive Folder.

RUSNOK TOOL WORKS
1845 W. Carroll Ave. Chicago, Ill.

Machining Thin Wall Flasks

It is reported that forged steel flasks, 21" in diameter and with walls only %" thick, are being machined to 0.010" tolerance on the outside diameter by means of special "Airgrip" chucks made by Anker-Holth Mfg. Co., Chicago.



Each chuck weighs 464 lbs. The 24" locator is mounted on a 15", 3-jaw, universal chuck. The jaws have 1" stroke, and they expand 1" in the flask. Twelve pads prevent distortion of the flask wall. A special feature of these chucks is matched false jaws that are balanced to within ¼ oz.

Welding Idea Contest

In order to get valuable information about arc welding to factory executives in a hurry, Hobart Brotherss Co. has added a "Welding Ideas For Victory" division to their regular \$200 monthly Arc Welding News Contest. Acting as a clearing house for war welding ideas, this division will prepare and release to the general public all welding ideas judged worthwhile to our war production.

No limitations have been placed or the number of prizes offered every month for "Welding Ideas For Victory." The company promises, however, to purchase and publicize immediately every worthwhile welding idea

Send your ideas for victory to "Offense Ideas," Hobart Brothers Co., Troy Ohio. Reports on the value of such items will be mailed back promptly.

Say-Way Internal Grinder

An internal precision grinder that will grind holes up to 9" deep and from ¼ to 18" in diameter, straight or tapered sides, has just been announced by Sav-Way Tool & Machin-

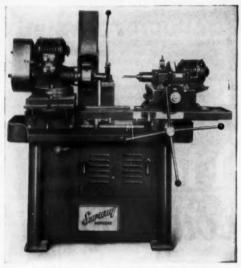
ing Co., Detroit.

Construction of headstock is such that loosening of two nuts permits an ad-justment to a distance of 31/2" at right angles to the wheel traverse. This allows grinding of angles not heretofore reached by rotation of headstock or traverse of the wheel. Headstock traverse 6", swing 18" full universal head. Variable V-belt pulleys provide four variations of work head speed.

Grinding wheel head may be adjusted to .0001". Diamond holder is of the swing type with microme-

ter adjustment, enabling operator to set diamond accurately for sizing holes. Machine is equipped with automatic wheel guard. Motors, bearings, coolant pump, electric controls, and grinding spindle are of leading standard makes.

Base is of welded steel construction. Ways, table and cross slide are cast iron, hand scraped to .0002". Table is struction thruout is rigid. placed on a surface plate set in 3 V-blocks and 3 flat blocks. Then top of table is scraped parallel with ways. Bridge is then mounted and doweled



into place. Top of bridge is then scraped to a given dimension parallel with top of table. This makes a positive base for cross-slide and headstock. Crossslide is of rigid cast-iron construction and hand-scraped to a given tolerance of .0002" overall. Ease of hand operation is assured by an eccentric bushing which is adjustable to compensate for wear in rack and gear.

Machine weighs 3130 lbs. and measures 40" by 22" at base. Suitable for both tool room and production grind-

GRIND-ALL

ALL WET GRINDING OPERATIONS Are Greatly Improved with GRIND-ALL THOSE FINISHES YOU HAVE LONG WANTED

A CONCENTRATE, Immediately Miscible with your present grinding fluid or solution.

Saves time—Those frequent shut-downs for wheel dressing are lessened. ORDER THRU YOUR MILL OR INDUSTRIAL SUPPLY JOBBER

If he will not stock or order for you-Send order to

Manufacturing Stadoil Company

Dallas, Texas

Los Angeles, California

Filtaire Dust Collector

Edward Blake Co., 634 Common-wealth Ave., Newton Centre, Mass., announce a new portable dust collector called the Filtaire. It is particularly suited for use with grinding and polishing machines where no central dust collecting system is available.

The motor and fan are located behind an inexpensive, replaceable Dus-top filter so that all bearings are protected from dust and grit. The 2 x 16 x



Write for lete informati HARDY Flexible discs that aid in eliminating wear and tear on the driving units.

DEALERS IN PRINCIPAL CITIES CARRY STOCKS FOR IMMEDIATE SHIPMENT.

LEXOID COUPLING CO., Div. THE SMITH POWER TRANSMISSION CO. 45 E. 23rd Street Cleveland, Ohio



20" Dustop filter is made from fire-proof spun glass. It is large enough, so that, in certain cases, it may be inverted and the other half used when the first half becomes filled.

The purified air is expelled thru a right angle elbow at back of the Filtaire so that an advantageous air circulation is created overhead.

The Collector is readily portable from one machine to another. Top of the unit is adjustable 7" horizontally. and 20" vertically so that it may be po-sitioned correctly for any machine, wheel, or type of work being produced.

The Filtaire is a complete, self-contained unit. It is only necessary to plug in the electrical connection to the nearest 110-volt outlet.

IMPROVED LAY_OUT DYE Jupreme

for TOOL. DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL DEFINED SCRIBED LINES

THIS HANDY **BRUSH-IN-CAP TRIAL CAP** SENT POSTPAID FOR ONLY 754

MICHIGAN 6350 East Jefferson Avenue

CHROME

CHEMICAL COMPANY

Detroit, Michigan

Machine Tool Allocation

A new general preference order. E-i-b covering deliveries of critical machine tools has been issued by the War Production Board effective May 1.

It provides for an apportionment of each producer's monthly deliveries of each size of each type of tool. 75% to Service purchasers and 25% to others.

Service purchasers were defined in the order as those assigned preference ratings by an original Preference Rating Certificate calling for delivery to a Supply Arm or bureau of the Army, Navy, or Maritime commission, or to one of their prime contractors, or their sub-contractors.

The 25% for purchasers other is to be divided among foreign purchasers a n d essential industries in this coun-

try and Canada, and will be scheduled for delivery in accordance with pref-

erence ratings.

Tool orders of foreign purchasers are given a blanket A-1-a preference rating, and no preference rating certificates are required for such orders. The orders, however, must be placed thru the Army Ordnance Department or thru the Procurement Division of the Treasury Department.

Types of tools are divided into 2 groups. Each producer is required to

You Can CROWD MORE MPING PRODUCTION

into fewer hours with a

Automatic operation insures complete safety - for men or women operators

Feed may be shut off without stopping press

Easy access to dies for setting - generous die space

★ 3 high operating speeds -180, 370 and 500

strokes per minute KEEP UP WITH WAR-TIME NEEDS

Write for a copy -

DIEBEL DIE & MFG. CO 3650 LINCOLN AVE.

CHICAGO

revise his delivery schedules with respect to tools in Group I on or before June 1, and July 1 for Group II.

However, deliveries of chucks and gages will continue to be governed by E-1-a, revised, until further notice.

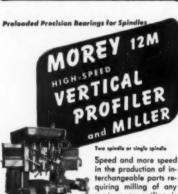
If a producer fails to receive enough purchase orders from either the Service Purchasers or the foreign and other purchasers to fill the allocation, he may under certain conditions complete his quota with orders from the other group.



Special Blades for shearing stainless steel.

BREMIL MFG. CO.

1720 Pittsburgh Ave.,



in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC. 410 Broome Street New York, N. Y.

Smith Tool Holder

A new model of their FlexoiD Tool Holder known as Model FTI is an-nounced by Smith Power Transmission Co., 1545 E. 23rd St., Cleveland, O. As shown, both the shank and revolving head have knurled surfaces, which, when locked in the correct cutting position, are said to eliminate chances of slipping.



Bit of this tool holder can be quickly adjusted to every possible cutting position without being removed from the holder or post, according to the makers. It is locked by a single cap screw, doing away with the need for using right, straight, or left hand shanks it is said. No change in centers is necessary when resetting cutter it is claimed.

The line comprises 5 sizes, taking bits measuring from 1/4 to 1/2" in square cross section. Holder width is % to 3" and length 6 to 10". Rexaloy bit is included with each unit.

Industry Battles Moths

Those long-time foes of woolen clothing, the moths, also have an appetite for felt washers used in power line equipment. Westinghouse research engineers recently developed a liquid insecticide treatment for the washers that makes them highly unpalatable, and eliminates switching failure due to moths.



SHARPEN YOUR OWN

SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information

THE WARDWELL MFG. CO. 3165 FULTON RD. CLEVELAND, OHIO

Microfilm

With production straining plant capacities seriously-with steel priorities and shortage of time making expansion difficult, space is at a great premium these days. One way of saving much office space is thru the use of microfilm.

In this way, all sorts of bulky material that is ordinarily filed can b e photographed and greatly reduced in size, saving a tremendous amount of filing space. In addition. with the manufacture of steel filing cabinets stopped for the duration. the problem of what to do when more filing cabinets are needed is solved.

Westinghouse is now transfering all its filing to microfilm, and in doing so is saving an acre of storage space for more productive use. This full acre of filed material will be stored in a vault 10 feet square.

More than two million documents will be photograhed over a two year period, ranging in size from 5" cards to 5' drawings. Records of typing paper size or smaller are photographed automatically at the rate of 35 a minute.

A special projector or "reader" enables engineers to see the enlarged reproductions on a screen. Photographic enlargements can be printed also if

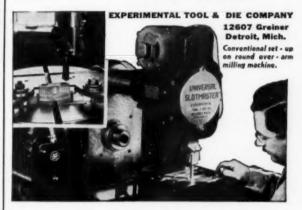
Eliminates Costly Set-ups

Example No. 3

Intricately shaped chuck jaw teeth can be cut using only one setup with a SLOT-MASTER. The jaws are chucked on a rotating table on a milling machine—a slotting table on a milling machine—a slotting tool is ground to the shape required and inserted in the clapper box tool holder. When one row of teeth is completed—the work is indexed to the next position, and so on, until the job is finished. Any other method . . Any other method would require several costly, cumbersome set-ups and it would be cumbersome difficult to maintain accuracy.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . The stroke of the ram is adjustable from 0 to 4".. the speeds range from 50 to 250 s.p.m. The tool holder of the clapper box type, can be turned in any position . . All of the working parts are of tool steel heat treated and ground to close tolerances . . SLOT-MASTER comes complete with pulleys. motor, belt and mounting adaptable to round over-arm or flat-on-round-overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.



working copies are needed for use as blue prints.

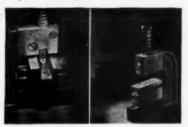
To assure safekeeping for these vital Westinghouse records, a master file of the microfilms will be stored in a fireproof, burglarproof vault. The film rolls will be placed in a series of asbestos compartments behind double doors which are locked by combination. 3 other complete files will be located in other parts of the plant tho for quick reference.





New Wales Punch

A new model Wales Punch and Die Holder that punches 3 holes per unit has been announced by the Strippit Corp., 1200 Niagara St., Buffalo, N. Y.



They provide exact holes for riveting small parts to channelled or flat material. With Wales individual holders these series of 3 holes can be punched in a straight line or at any angle according to the set-up of holders on rails or T-slotted plates.

Nothing is attached to the ram of the press. All that is necessary is to lock holder in position on rail or Tslotted plate and start punching. They can be reset or removed quickly to provide practically unlimited patterns.

Metal Operation Computation Catalog

E. W. Bliss Co., 53rd St. & 2nd Av., Brooklyn, N. Y. has issued a 52 page catalog on "Computations for Sheet Metal Working Operations."

As stated in the foreward, "In the working of metal in mechanical power presses, it is often desirable or necessary to compute the pressure capacity and sustained work capacity of the press as well as the pressure and work requirements of the job which the press is to do. A series of alignment diagrams for ease in making these computations has been prepared from such formulae as could be developed.

. . Diagrams will be shown . . taking up first the several types of operations performed upon metal, and later the capacities of the equipment."

Reclamation

One of the most novel ways of helping relieve the metal shortages is that now being used by Walter Illick, a former Western gold miner. He is mining the old Los Angeles city dump, and is finding it rich in iron, steel, copper, and tin, as well as silver and gold.

"If Hitler had what we've thrown on the dumps of the nation, we'd be twice as long licking him" says Illick. But many unemployed miners, able to get a moderate amount of used equipment, should be able to prospect city dumps thruout the country and salvage many tons of vital war materials. In fact, he claims that old dumps can provide enough tin to replace the 100,000 tons we have been importing every vear.

It all started in 1940 when Illick was visiting a former

mining partner across the street from the dump. Mexicans were sorting by hand, the copper and brass on top of the dump. Illick wondered what could be reclaimed from the stuff if 5 or 10 tons of it were put thru a mill. He bought a second hand mill and the results were astonishing.

First, a drag-line pulls material into a revolving drum, where it is broken up and washed. Magnets take out all iron and another revolving drum sifts out everything smaller than a dime. Then the balance passes over moving



FINGERPRINTS FOIL ORDINARY RUST-PROOFING!



PLY-RUSTEX

PLY-RUSTEX provides the "missing link" in rust-proofing high-precision parts. When you use PLY-RUSTEX CREAM—applied to the hands—there's no chance for fingerprints to form corrosion areas. The combination of PLY-RUSTEX LIQUID and CREAM affords positive protection before, during and after machining or processing operations. In addition, it protects workers' hands against industrial dermatitis. NO OTHER SIMILAR PRODUCT OFFERS ALL THESE EXCLUSIVE ADVANTAGES!

Write TODAY for complete details of this new rust-proofing material and technique.



The MILBURN Co.

belts, where the metals, glass, etc. are sorted by hand.

They work 100 tons a day out of the 250,000 tons in the dump. From this they get half a ton of solder daily. Since solder is about half tin, this means 6 or 7 tons of it monthly, and about the same amount of lead. The principal drawback is that there is little aluminum, the use of which has become so widespread only in recent years.

(From Ghost Town News, Buena Park, California.)

Artus Plastic Spacers

New plastic spacers are reported to save brass and steel and to speed up milling machine operations in the manufacture of airplanes, locomotives, electrical equipment, pneumatic and precision tools, and other goods.

Plastic spacers are available in 10 thicknesses, each with its own identifying color. Easy identification of thickness speeds production by eliminating loss of time in micrometer-caliper

measurements and long fitting and adjusting.

The spacers are made in thicknesses from .001 to .020" with hole diameters as large as 2" with standard keyways. Larger sizes with outside diameters up to 10" may be had on order. The spacers are said to retain their thickness and evenness under all normal working conditions.

Trade-marked Artus Spacers, they are made by Industrial Products Suppliers 2 Broadway, New York City from "Plastacele" cellulose acetate plastic produced by the Plastics Department of the Du Pont Company.

Marking Engineering

being offered by the Acromark Corp., 913 Morrell St., Elizabeth, N. J. It is

in 2 sections-First Principles of Mark-

ing Engineering, and Practical Appli-

A course in marking engineering is

REINFORCED PRESSURE GREASE Easily applied with ordi-

Easily applied with ordinary pressure systems tenaciona texture adheres to paris which require constant lubrication. A Reinforced Lubricant manufactured from high grade material and compounded with Motor Mica Anti-Friction Compount of 122 degrees F. and aworkable condition at zero.

Write for Details Today



PRESSURE GREASE

SCIENTIFIC LUBRICANTS CO. 3462 N. CLARK CHICAGO, ILL.

course is conducted by H. O. Bates, founder of the company. PRECISION BORING & SPOTFACING

cation of Marking Engineering.

— with fewer motions in less time

The B&B SPOTFACER & BORING TOOL is one of the most versatile, indispensable, and efficient tools any tool shop can possess.

In this device are many tools in one—with every application designed for precision work and speed. Boring diameters range up to 22 inches, within 0.0001 inch. Micrometer adjustment in head.

Wide range of spotfacing also offered. The B & B always produces bottoms of holes that are flat and square to sidewalls. Adapters are provided for boring small holes and also inverted and long holes.

Let us send you folder H341 which gives more detailed information about this distinctive tool.



BOKUM TOOL CO., 49 W. HANGOCK AVENUE DETROIT, MICHIGAN

A CLAMP for Every Purpose



Forged Steel Quick Acting Deep Reach Welders



Sizes Available:
3/4 to 10 opening

1/2" to 16" deep

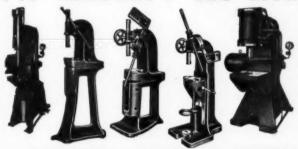
Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co.,

1945 WAVERLY AVE., CINCINNATI, OHIO

For AIRCRAFT and MUNITIONS



1883 GREENERD

The Originators of the Arbor Press

1941

PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $\frac{1}{2}$ to 30 tons pressure.

Let us send you our catalog No. F.

GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected _ save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON Brooklyn, N. Y. 429 Kent Ave.



Micrometer OFFSET BORING HEADS

Offsets 1/2"-Head 21/4" overall Micrometer Dial-50 divisions-.001. Three Tool Holes-one hole runs true with arbor.

All parts nickel-chromium steel, SAE 340. Two 14" Boring Bars fitted with H.S. Tool Bits and Three Wrenches with each head.

FRAY MACHINE TOOL CO. 501 W. Windsor Glendale, Calif.

Manufacturers of "All Angle" Milling Machines and Attachments

Hydraulic Work Holder

Manufacturing and sales of Hydra-Grip, a recently developed hydraulic work-holder for gang-chucking operation, have been taken over by Interaircraft Machine Shop, Inc., 3851 Medford St., Los Angeles,

The Hydra-Grip holds 10 pieces of work, by interchangeable collets, in accurate alignment for precision machining on milling machines, shapers, grinders or drill press. Pieces to be machined are dropped into the collets, and the alignment is instantly set and held by the hydraulic pump. Pressure is released by a quarter turn of the release valve, for instant unloading. By reduction of loading and unloading time and the fact that ten pieces are machined with one set-up, production time is substantially reduced.

Interchangeable round collets are available in a full range of sizes from 1/4" to 11/4", by thirty-seconds. Special sizes and shapes are available. controlled wrapping action of the collets insures tight grip on all 10 pieces of work. The Hydra-Grip is self-contained, without outside lines or connections, and in no way changes nor-

mal machining practice.

Jacobs Chuck Bulletins

Jacobs Mfg. Co., Hartford, Conn. has just issued a 12 page Bulletin, No. 39A describing their plain bearing, ball bearing, portomatic keyless, and positive drive tap chucks. There is also a handy page with charts of methods of fitting.

Another Bulletin, No. 39L, describes their headstock, center rest, hollow spindle, and ball bearing chucks for

lathe use.



RAPID COMBINATION SAW

Change from full throat to taper in 30 seconds. Pat-ented handle locks blade tight...change in 2 seconds. All-steel construction...crackle grip handle. 6 Types. Write for complete information.



RAPID MANUFACTURING CO. Box 488. Glendale, California

Production

"Demands the machine tool makers a r e dependent entirely upon the military picture. With each set - back come new demands for more a n d faster arms production" said F. V. Geier, president of the Cincinnati Milling Machine Co. recently.

"The more strategic points we lose, the greater the demand for production of goods to retake these points. The longer our supply lines become, the more things we must make to maintain them and supply field armies. Costs of recovery are far greater than those of holding.

"I have been asked if the tool making industry is over the hump in the production war. How does any one know? Who knows when we will stop losing?"

Another major tool maker reported that they are shipping as much in dollar values of tools in a week now as they did in the full year of 1932. In fact, this year the entire machine tool industry will produce 1½ billion dollars worth of tools as compared to 225 million in 1939.

The work of producing machine tools is so important that the raw materials from which they are made, carry the highest of all priority ratings—A-1-A. In the last war they were only given

IMMEDIATE DELIVERY

SIGOURNEY Sensitive

DRILLING
MACHINES
Bench and Floor Type

Sigourney Drilling Machines, a standard for years for extreme sensitivity and accurate drilling at high speeds, are now available in limited quantity for immediate delivery on orders with

suitable priority.

TWO SIZES: No. 0, Drilling capacity 0-1/m". Spindle speeds, R. P. M. 2000, 4000, 8000, (pulleys can be furnished to supply 10,000 R. P. M.)

No. 1 (illustrated) Drilling capacity 0-1/4". Spindle speeds, R. P. M. 950, 1600, 3000.

ding.

Apply directly to . . .

Sigourney Tool Co.,

Hartford, or . . .



TELEGRAPH ORDER TO:

PRATT & WHITNEY
Division Niles Birment Pond Co. West Hardord, Compecting

an A-6 rating. Now machine tools stand above bombers, battleships, and tanks, for they are the tools from which these offensive weapons are made.

This second maker, R. K. LeBlond, reported that the industry's chief problem now is labor. In the Cincinnati area, for instance, there has been no unemployed skilled labor for nearly 3 years. Their labor isn't just semiskilled; it takes years of practical experience to be a good mechanic in a machine tool plant.

Deepfreeze Unit

Deepfreeze Division of Motor Products Corp., 2301 Davis St., N. Chicago, Ill., announces the production of Santocel low temperature chilling equipment for delivering controlled temperatures from -60 to -120F.

The equipment is useful in freezing rivets, facilitating shrink fits in assembly operations to relieve strain and possible fracture, shrinking bushing and bearing inserts sufficient for proper in-

sertion, etc.

RELEASE LARGER MACHINES FOR HEAVIER WORK!

This machine is ideal for tool, die, fixture and pattern work. Is versatile and accurate.
Micrometerscrew feed quill. Direct reading eliminates pencil figuring and possible er-rors. Smooth accurate boring is assured to any predetermined depth to 3°.



Write for descriptive Bulletin.

PUT SMALL JORS ON THIS

VERTICAL MILLING AND JIG BORING MACHINE

LINLEY BROS. CO. 11 MONTAUK ST. BRIDGEPORT, CONN. Fell Precision Level

A new precision level has been announced by Wm. B. Fell Co., 700 South St., Rockford, Ill. It is graduated to



.0005" per foot. According to the makers, it is exclusive in its ability to indicate whether or not a machine tool or a structure is level all ways at once.

It is made in 2 sizes-31/2x6" and 51/2 Variations of as little as .00025" per foot are claimed to be detected readily.

Balanced Pressure Seal Bulletin

Stevenson Engineering Corp., 45 Willard Ave., Providence, R. I. offers Bulletin No. 1 showing their Sealol Balanced Pressure Seal. Sealol is a 5 part mechanical seal for rotating shafts, with initial sealing contact between sealing ring and hardened lapped face achieved by a light corrugated spring. Sealing against pressure is maintained by fluid pressure itself acting upon 2 opposing surfaces of different areas.

HIGH PLANISHING AND COLD RIVET SPEED IN AIRPLANE AND SHEET METAL WORK

Specially designed for finishing sheet steel up to 18 gauge, and for

SFH 24-12 PNEUMATIC

shaping and forming aluminum-also for setting solid ¼ iron rivets cold. Stroke can be adjusted from a feather touch to a heavy blow. Powered PNEUMATIC
HAMMER
by compressed air. Brackets can be raised or lowered to suit. Used in many American and foreign aircraft and industrial plants. Write or wire today.

SEIDEN PNEUMATIC TOOL CO., JACKSON, MICH.



Rubber Abrasive Polisher

H & H Research Co., 12540 - 12th St., Detroit, announce an accessory in the form of a rubber pad impregnated wth abrasive, formed in any size up to 3" x 1" and mounted on a 2" offset



holder for use with their Senior Modèls. This can be provided in grits ranging from 80 up to 180 and in various shapes within the dimensions given.

Primary uses are for removing the last few thousands and producing mirror-like polished finishes on such jobs as dies, molds, etc. Scratches produced by files (invisible to human eye inspection) are brought out plainly and removed. Many stages of emery cloth polishing operations, necessary in building up highly polished surfaces, are thus eliminated and the operation placed on a production basis.

The reciprocating action of the portable electric filing and honing tool itself, mechanically reproduces the natural push and pull action of such hand operations as filing, honing and polishing. Special files and hones, in addition to this new accessory are all illustrated in a recent catalogue HH-100.

Airgun Bulletin

Air-Way Pump & Equipment Co., 401 S. Jefferson St., Chicago has issued a 4 page bulletin describing their Leak-proof Air Gun. It is well illustrated, showing the gun in many uses. Different models are pictured, and their features explained. There are also descriptions of their 10 hose fittings.



QUICKER-STRONGER

The exclusive patented design of PECO Quick Action Clamps provides exceptional speed of opening and closing and assures a positive lock impervious to pressure and vibration. In models 1561 and 1514 handles are down out of the way when in the locked position, making it easier to get to work when machining, milling or fabricating.

In its full line of seventeen originally designed clamps PECO presents the only clamps with drop forged handles and clamping bars. Send today for catalog on PECO.

PRODUCTS ENGINEERING CO.



A NECESSITY IN EVERY PLANT WHERE ACCURACY IS DESIRED

THOROUGHLY NORMALIZED and WEATHER SEASONED, PLANED and SCRAPED on same 3-POINT BEARING on which they will rest in use. GUARANTEED ACCURACY within .0003° on 24° x 36° size. AVAILABLE PLANED and SCRAPED in standard sizes 12°x18° to 36°x72°. THE ONLY PLATE that has a 50% trade in value when purchasing a new REID plate.

Prompt delivery on priority orders.

Tool Engineering Service Co., Inc. 243 Washington Ave. Nutley, N. J.



Motor Manufacture Bulletin

The manufacture of motors and controls for general industrial use is described in a new 32-page catalog an-nounced by Westinghouse.

Designed to show the many phases of research, production, and testing of motors and controls, a number of photographs are used to illustrate most of the scenes that would come to the attention of a visitor going thru this department of the E. Pittsburgh works. Mass production of precision parts, multiple dipping and baking, and foundry operations are among the procedures described and illustrated.

Line assembly and testing of controls is covered pictorially, showing how precision tools and gauges coupled with operator skill contribute to accurate and rapid production. Material handling layouts show the use of conveyors and arrangement of parts for as-

sembly.

A copy of booklet A-3023 may be secured from department 7-N-20, Westinghouse Electric and Mfg. Company, E. Pittsburgh, Pa.



the hotel preferred hotel metropole

a stopping place modern in every detail, yet maintaining a friendly atmosphere and hearty hospitality • preferred by experienced travelers • dining room • garage adjacent • rooms from \$1.50 • with bath from \$2.50

cincinnati

War Production Means: More Production! ORDER NICHOLSON EXPANDING







TYPE B-STRAIGHT JAW DESIGN

Size	Range Bores Taken	Net Price
1X 2X 3X 00 0 1 2 3	1/2" to 9/16" 9/16" to 21/32" 21/32" to 34" 34" to 7" 34" to 1" 1" to 1/4" 11/4" to 1-9/16" 1-9/16" to 2" 2" to 2½"	\$10.00 11.00 12.00 14.00 16.00 18.00 21.00 29.00 40.00

TYPE A STEP JAW DESIGN

| Size | Range Bores Taken | Net Price | 1A | 1/2" to 1" | \$12.00 | 2A | 1" to 11/2" | 16.00 | 3A | 11/2" to 2" | 23.00 | 4A | 2" to 3" | 34.00 | 5A | 3" to 4" | 40.00 |

(Other Sizes taking up to 78)

ECONOMY TOOLS . . . for holding work while being machined between centers on lathes, grinders, millers, shapers, etc. Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO., 117 OREGON ST., WILKES-BARRE, PA.

FOOL-PROOF CUTTING LEFT and RIGHT INTERNAL and EXTERNAL

- -UP to 7" OUTSIDE DIAMETER
- -5 to 40 THREADS PER INCH
- -1 to 5 PITCH METRIC

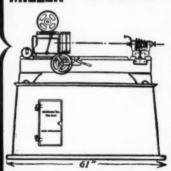
on shells and bombs up to 155 mm O. D.

The "Clinton" Automatic Thread Miller offers multiple advantages to prime and sub-contractors faced with "impossible" delivery dates. In the "Clinton", accuracy is combined with ease of operation, economy, parts interchangeability, precision, and simplicity. Backed by 25 years of successful operation.

LOW FIRST COST—TWO WEEKS DELIVERY
Write for descriptive bulletins

U. S. MACHINE

AUTOMATIC THREAD MILLER "Clinton"



TOOL MFG. CORP.

TERRE HAUTE, IND.

Portable Balancing Machines

A Portable Wattmeter Type Balancing Unit, capable of one-man easy transfer where needed, is now offered by Gisholt.



It was designed by Westinghouse Research Laboratories to detect unbalance in large rotating parts of special design without dis-assembly from their parent machines, making possible easy correction—and maintenance of proper balance, under actual operating conditions.

Such special machine parts, in small quantities, with rotating speeds from 100 to 10,000 rpm can be checked for unbalance by this means, which indicates both phase angle and amplitude of vibration. From these readings, locations where corrective weights are needed may be readily determined.

This simplified unit is not a substitute for—but rather an augmentation of—the accepted Gisholt line of "production" balancing equipment, and thru the portable feature adequately fills industrial needs for a reliable, movable, "special-purpose" instrument. The entire equipment is contained in two conveniently-handled cases.

Further information may be obtained from Gisholt Machine Co., 1185 East Washington, Ave., Madison, Wis.

Cincinnati Grinder Catalogs

Two interesting new publications of Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinati, O., are available.

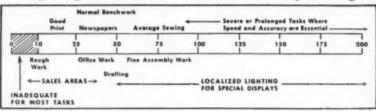
Catalog G-490 (20 pages) contains illustrations, a brief description, and complete specifications for Cincinnati 10" Plain Hydraulic Grinding Machines. It is the first publication available for these precision center-type grinders, and conforms to their standardized specification catalog format.

Catalog G-491 (also 20 pages) covers a well known Cincinnati product, the 14" and 16" Plain Self - Contained Grinders. It supersedes G-392. All important details and specifications are included.

Hard Chromium Plating

A new 16-page data bulletin summarizes the applications where Industrial Chromium Plating saves materi-

Lighting Levels Recommended for Easy Seeing



This chart shows the footcandles of illumination recommended by lighting experts for various types of visual tasks. The levels are easily obtained through using the right light. But, for maximum efficiency and economy, this light must be combined with proper paint colors in machinery as well as working surroundings.

als and man-hours in the production and maintenance of metal products. It gives specific examples of how production - rejects and metal - working tools are being salvaged; how the service life of tools, gauges, wearing parts, etc., can be greatly increased; how hard-to-get equipment parts and tools are being reclaimed when worn. Also offers suggestions on how existing plating equipment can be converted to "hard" chromium plating for war production-or how this work can be obtained through competent job plating shops. It will be sent on request for Bulletin No. 28 by the United Chromium, Inc., 51 East 42nd St., New York,

Subcontracting Sheet Metal Work

Just off the press is an interesting and informative new catalog "Data on Production Facilities." It presents to manufacturers, who must of necessity sub-contract certain sheet metal parts and assemblies, a complete list of machines that comprises the Kirk & Blum facilities for prompt execution of sheet metal, sheet steel, and light plate fabrication. The name and size of each piece of equipment is also listed.

Thruout the catalog are many illustrations of the various sheet metal parts and large assemblies that have been fabricated under contract for many leading national industries.

A copy of this catalog is available from The Kirk & Blum Manufacturing Co., Spring Grove Ave., Cincinnati, O.

Winter Bros. Tap Booklet

A handy 28 page booklet has been issued by Winter Bros. Co., Wrentham, Mass. It starts with a short history of taps and tapping, and follows with descriptions of modern taps in practical use—hand, machine screw, chip driver, straight shank tapper, bent shank tapper, straight pipe, taper pipe, interrupted thread, nut, and pulley taps, serial sets of hand taps, acme and square thread taps, coupling taps with JL relief, relieved and concentric thread taps, etc.

There are also suggestions on speed of operation; tapping long holes; size of drill; lubrication; and causes of troubling while tapping. A handy table of pitch diameter limits is also given.

Stow Flexible Shaft Units

A new bulletin has been issued by Stow Mfg. Co., Binghamton, N. Y. describing their line of flexible shaft units with heavy duty 45 and 90° angle drills for difficult drilling in hard to reach spots. Spindle heads are threaded for adapters ½ to 28 thread, accommodating either stub or full length drills up to No. 30 size.

It also gives details of the 45 and

90° direct drive drills.



Such rapid progress was made in the construction of the new Army Cargo Ship C-46 at Curtis-Wright Corp., that is was ready for removal from the splicing fixture long before a new overhead crane could be installed.

To save time, an improvised Cleveland Tramway crane was made up within 5 days of sundry parts on

hand.

These ships will be the world's largest air transports.

YANKS WILL RECAPTURE BATAAN

YES, our boys at the front can change the headlines if all of us at home back them up to the limit. It is vitally important that all our factories maintain maximum production, but all of us on the home front must continue our purchases of war savings stamps and bonds.

You who are engaged in war production work have a special duty in connection with the war bonds. You know the magnitude of the production task before us better than most civilians. You know the sweat, the toil, the time. and the expense involved in making this tremendous volume of war material. And because of all this, you have a better idea than most of the rest of the country how costs of war equipment mount-how important it is that we buy all we can afford, and then some, of United States War Savings Bonds and Stamps. And you can convey this enthusiasm to others whom you contact and persuade them to do their part too.

Of course, the principal reason for our government asking us to make such great sacrifices to buy War Savings Bonds is that they must have money to carry on the war. But there are other reasons too. In spite of the recent government order freezing prices on most commodities, there is still grave danger of further inflation. Draining off some of this excess purchasing power into War Bonds will help avoid inflation and make the money which you don't invest in War Bonds go farther.

In addition, production of practically all except essential civilian goods has been stopped. Since there is so much less on which to spend your money, why not invest that money in War Bonds! Also, that money invested in War Bonds now will enable you, after the war, to buy the luxuries on which production now has been stopped.

You as an employer, and you as a war production worker, can also do your part to safeguard your company's staying in business and help to insure your own jobs thru purchases of War Bonds. In this, you will be doing a great deal to avoid post-war deflation and another severe depression. As the bonds become due, and the government pays you back your investment, with interest, this money that you will be able to spend then will help maintain a high rate of production and avoid serious layoffs of men as production is converted from military to civilian use again.

In the countries that we are fighting. the government wouldn't ASK the people to buy such bonds-it would FORCE them to do so. In asking you to help out by buying these bonds, the government is also PAYING you well for doing so, thru the interest you will receive. And remember that when you spend your money for United States War Savings Bonds, your money is not being taxed or confiscated, but is being INVESTED in the most reliable investment in the world-your government. TODAY allot as much as you possibly can to the War Savings Pay Roll Allotment Plan. Buy a share in America!

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 45c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company. Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

Aaron Machinery Co.,

Anron Machinery Co.,
Automatic screw machines, Cleveland, Model A, 14",
\$", \$", 44", 5"
Boring mill, Bullard 36" vtl., 2 heads, 42".
Boring mill, Bullard 36" vtl., 2 heads, 42".
Boring mill, 88" Colburn, 2 heads, m.d.
Boring mill, Rockford's "horizs, m.d.
Eagraving machines, Gorton, pantograph, all sizes.
Eyeletting machines, United Shoe, Model B.
Eagraving machines, United Shoe, Model B.
Gear cutters, 11" Gleason, bevel, (2).
Gear cutters, 11" Gleason, bevel, (2).
Gear hobbers, G. & & Shuchardt & Schutte
Gear hobbers, G. & & Shuchardt & Schutte
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G

Van Norman, No. 2 Millers, Becker vert.

Grinder, Van Norman, No. 2, 3A. Grinder, Norton 16"x50. Grinders, Modern, m. d., 12x24", 12x42". Hammers, Pettingell trip. No. 1, 2. Index filing machines, Oliver. Keyseaters, Becker No. 0, 2.

Reliance Machinery Sales Company 1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 348 and 450 cu. ft.
Bolt cutter, 3" Acme. belt drive.
Brake, press. 6 x16 ga. Robinson, toggle.
Buildoser, No. 4 Williams-White.
Grinder, No. 14 Bealey double disc, 26" discs.
Hammers, riveting, 3/16" 1/4" and 3/8".
Hammers, riveting, 3/16" 1/4" and 3/8".
Hammers, 50 lb. Mayer, 46 lb. Bradley helve.
Lathe, spinning, 30" Toledo, roller bearing
Miller, 30" x10" Newton slab, m. d.
Planer, 24" x14" x2" Fowell, 1 head, rev. m. d. 220 v., d.c.
Press. No. 82 C Toledo dbl. crank, 44" wide, 5" shaft,
2" stroke, m. d. Air compressors, 348 and 450 cu. ft. stroke, m. d. 2" stroke, m. d., Pump, Goulds centrifugal, 3 stage, 250 g.p.m. against 47 'head, m. d., 3-60-220 v. Pump, hydraulic, 15 G.P.M., 1500 lb., m.d. Punch, L&A horiz., 1" thru 1". Shear, rotary bevel, 4", m.d. What do you need? What have you for sale?

Lathes, 1688, 1886, 1810', quick change,
Lathe, American, 18''x10', taper.
Lathe, Hendey, yoke, 14'', 29''.
Lathe, 24x10' Reed-Prentice, grd. head, m.d.
Lathe, 24x10' Reed-Prentice, grd. head, m.d.
Lathe, 24''x14' Reed-Prentice, geared head.
Lathe, 54''x14' Reed-Prentice, geared head.
Lathe, 54''x3'' American, 5 step cone.
Millers, B. & S., Cincinnati No. 2, 3.
Pipe machines, Oster, Williams, 2'', 4'', 6'', 8'', m.d.
Presses, power, all sizes and types.

176 Lafayette St., New York, N. Y.

Presses, power, allisizes and types.

Press, power, Bliss No. 305.

Press, power, No. 55 Consolidated, wth side trimmer.

Press, power, No. 55 Consolidated, wth side trimmer.

Press, frimming, No. 12 Waterbury-Farrer, with side trimmer.
Punch, Pels & throat, I "thru I".
Punch, Pels No. 23, triple comb.
Radial drill, & Western, oil groove base, m.d.
Screw machine, Gridley \$\frac{2}{4}\]", single spindle.
Screw machines, cleveland \$\frac{4}{3}\]", \$\frac{4}{3}\]", model A, auto.
Screw machines, automatic Fay.
Shear, beam Pels No. 14.
Turret lormer, Brown & Sharpe No. 2.
Turret lathes, Giabolt, \$\frac{2}{3}\]", 21.
Turret lathes, Giabolt, \$\frac{2}{3}\]", 21.
Turret lathes, Giabolt, \$\frac{2}{3}\]", 21.
Turret lathe, Warner & Swasey, No. 2A, univ., s.p.d.
Hydraulic pumps, presses, accumulators.

Hydraulic pumps, presses, accumulators. 200 spindles of single and mult. spindle drill presses.

Russell Machine Co.

Pittsburgh, Pa. 438 Oliver Bldg.

438 Oliver Bldg. Pittsburgh, Pa. Broach, No. 2 LaPointe, m. d. Bulldozer, No. 4 Wms. & White, m.d. Gear planer, 36" Gleason, b.d. Gear planer, 46" Gleason, m.d. Grinder, univ. No. 5 B&S, 29x 20", b.d. Grinder, univ. No. 5 B&S, 29x 20", b.d. Hammer, 80 lb. Little Glant, b.d. Lathe, 20"x12" Reed-Pren., grd. hd., q.c.g., m.d. Lathe, 10"x12" Reed-Pren., grd. hd., q.c.g., m.d. Lathe, 10"x15" Sence Falls, b. d. Pipe machine, Williams, 23" to 8", m.d. Press, hyd. 1000 ton wood platen, 42"x5" Presses, o. b. i. No. 3 Toledo and No. 18 Bliss. Punch, multiple, atyle "E" L&A 134" th. cap. 340 tons. Punch, No. 2 Hilles & Jones, horix, b.d. Shaper, draw cut, 48" Morton, m.d. Shaper, 20" Hamilton, high duty, m.d. Slotter 18" Dill, table 34" diam., m.d. vince for the state of t

FOR SALE BY

Siegman Machinery Co.

561 W. Washington Blvd., Chicago, Ill.

561 W. Washington Blvd., Chicago, Ill.
Automatic, Cleveland, model B 18". 2" cap. (2).
Automatic, Cleveland, model C 2" cap.
Broach, vertical, Michigan, 2 ton.
Drill, 4 spindle, hois hog, double worm.
Drill, camelback, 2 spindies, large base.
Drill, propostal, 2 way, 18" travel.
Grinder, No. 1 Gardner surface, hydraulic feed to tbl.
Grinder, Brytal, 80.
Grinder, Landis cam.
Grinder, Landis cam.
Grinder, Lower and Company of the Company o

Please send us your inquiries.

Alex Zeeve & Company

2269 Woolworth Bldg., New York, N. Y.

Bolt threaders, 2" Acme "Class A", 14" National. Drills, radial, 3" Mueller, gear-box, s.p.d., (2). Gear cutter, apur, No. 2A Newark, s.p.d., cap, 24"x8" Grinder, cyl., 12" 286" Landis plain. Hammer, torging, No. 5N Nazel. Hammers, pr., 500 (2) & 400 lb. Beaudry "Champion". Hammer, steam, 250 lb. Nilez-Bement-Pond, sgle. fr.

Hammer, steam, 200 lb. Wies-bemeer-rond, agite. It. Ironworkers, comb., size cpd Schatz cast-steel, shears 3".12" beams & channels, 6"x6"x4" angles, 14" plts, punches 1-9/16" thru 14", with coping att, weight about 22.000 lbs,: Size 91-16 Smith armor-plate, with

about 72.000 lbs.; Size 91-16 Smith armor-plate, with notcher, a.c., m.d.
Keyseaters, No. 2 Mitts-Merrill, No. 2, 1, & 0 Baker, Lathes, engine—39" 22" Rahn-Mayer-Carpenter semi-q.c.; 28"x16" Walcott, q.c.g., taper, 24"x16" Whitenomb Blaisdell, q.c.g., t., 14"x8" Frad., gh., qcg., m.d. Lockformer, 22 gauge, a.c., m.d.
Miller, No. 6 Whitney, hand, a.c., m.d.
Punch & shear, dbl. end, style "W" Cleveland, cap. 24" thru 14", withself-cont, jib crane.
No. 3A Royersford, cap. 1" thru 1", shears 8" x 1" flats or 14" rounds, a.c., m.d.
Rolls, plate-bending, 18"x18 cap. Bertsch, drop-end hsg., bab. bar; geared a.c., m.d. wg 130,000 lbs.
12" 31" cap. Hilles & Jones No. 4, drop-end hsg., bab. pargeared d.c., m.d.

bal. bar, geared d.c., m d. Saw, metal cut. band, Avey "Milband", cap. 6\"x6\". a.c., m.d

a.c., m.d., %if Steptoe h.d., b.g., cone: 6" Ammco bench a.c., m.d., with index centers & rotary table.
Shears, throatless, 4" & 10 g.s. Marshalltown, a.c., m.d., %if T. Lennox rotary splitting, a.c., m.d., 6" Yder rotary, 14 gauge capacity, ..., 2" A.c., m.d., %if Y. Lennox rotary splitting, a.c., %if Y. Lennox rotary s Tapper, No.8 Gaterman pneu. oscillating, |"xt" cap.

ALSO MANY OTHER TOOLS.

C. R. Daniela

1514 W. Capitol Drive, Milwaukee, Wis.

Arbor press, No. 5 Greenerd, 12 ton, rebuilt. Drill press, 29" Barnes, with ac motor drive. Drill press, 25" Barnesstationery head, b d Motor drive. Master, for Kempsmith milling mach. Sawing and filing machine, Theil precision.

FOR SALE BY

Globe Machinery Co.

602 W. Lake St., - . Chicago, Ill.

GUN DRILLS.

1 Pratt & Whitney & 8 Banach, 2 spindle horiz. 12"
cap. size 1329 8" bed, swive?"

Broach, La Pointe-Hudson, No. 3, m. d.
Drill, radial, 3" American, table type.
Grinders, 10"x24" & 10"x36" Norton cyl., m. d.
Lathe, gap, Harrington 26"x48"x12" additional 8"
raising blocks, sliding bed.
Lathe, 10hnson, 21"x14", gd. hd., 2 steady rests, face
plate, arr. m. d.
Lathe, 10"x14" Lodge & Shipley, g. h., m. d., t. a., h. d.
Lathe, 20"x10" Whitcomb B., gd. hd., m. d., complete.
Lathe, 24"x12" Lodge & Shipley, g. h., m. d., t. a., h. d.
Lathe, South Bend, 42"x14', 10' between centers, m. d.,
5 years old

5 years old. Pipe threading machine, cap. 2" to 8" arr. m. d., in-

cluding 8 dies, cutting-off-attach. & oil pump.
DRILL PRESSES 4-Spindle 20" Barnes, upright 14x60" table, back grd.,

No. 4 mt. 4-Spindle Superior b.b. table 12\(x50'', No. 3 mt. 4-Spindle Allen, 17\(x48\) table, No. 2 Morse taper.

Wm. C. Johnson & Sons Machy. Co. 1211 Hadley St., St. Louis Mo.

Air compressors, 15 in stock.
Bolt threaders, 1". 12" & 2" Acme.
Drill, Natco 13 spindle, No. 1 taper.
Drill, No. 2 Fox, 6 spindles.
Drills, radial, Drillmaster, new. Drills, Sipp, m.d. single spindles, (2), Forging machine, Ajax 2", Gear cutters, No. 1 Bilton, (2). Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb.

Little Giant.

Hammers, own, Densury, 1.

Hammers, and I. Berney, 1.

Little Giant. No. 1, like new.

Lathes, 19x24, Logans, m.d., new in stock, (10).

Lathe, 28'x14' Graves & Klusman, q. c. g., t. a.

Lathe, 28'x14' Hamilton, q. c. g., t. a.

Lathe, 28'x14' Hamilton, q. c. g.

Little, Burr, 42" table.

Miller, No. 3 Knight vertical.

Millers, 2, Lincoln type.

Pipe machines, 2"-4"-6"-8"-13".

Pianer, 34''x32'x18' Gray, 2 head.

Pianer, 34''x32'x18' Gray, 2 heads.

Planer, 34''x32'x18' Gray, 2 heads.

Planer, 69''x60'x10' Sellers.

Planer, 60"x60"x10", Sellers.
Press, 55 Swaine.
Press, 69 N Bliss, double acting.
Press, eps. 1,200 ton 45" Niles.
Press, Excelsior d. crank bed 62x26—1½" stroke.
Press, Excelsior, hydraulic 200 ton vert.
Punches, shears, bulldozers.
Roll, plate straightening. H. & J. No. 2, like new.
Shapers, 12"—16"—20"—24".

ders, spot, new-3 in stock. Large stock guaranteed electric motors. Any size.

Wm. C. Johnson & Sons Machinery Co. 1211 Hadley St. St. Louis, Mo.

Hammers, 3—100 lbs., Bradley.

Press, No. 5 Garrison double crank forging, 6" stroke 13" die space \$9x10" bolster plate, 27,000 lbs.

Presses, 3—Frankford double crank forging \$4" stroke 18\frac{10}{2}" die space \$4x9\frac{10}{2}" bolster plate, 13,000 lbs. each.

Presses, 2—No. 5 Garrison double crank forging, 6" str. 18" die space \$2\frac{1}{2}\text{10" bolster plate 24,000 lbs. ea.}

All of above equipped with hot shear blades.

Press, William White No. 15 geared, 1\frac{1}{2}" stroke.

FOR SALE BY

Lang Machinery Company

28th St. & A. V. R. R.

Pittsburgh, Pa.

Air compressor, 1.0°x10" Ing., Rand. 245 c.f.m., m.d. Air compressor, N. Se30 Chicago, 492 d.d., oil dr. Blower, 6-B Wilbraham-Green, 45 c.f., m. d. Air compressor, N. Se30 Chicago, 492 d.d., oil dr. Blower, 6-B Wilbraham-Green, 45 c.f., m. d. Bolt cutters, Acme sgl. & dbl. head, 14"—24". Bolt cutter, staybolt 1½" Acme, leadscrew, m.d. Broach, No. 2 La Pointe, stroke 44", m. d. Bulldozers, No. 2 & No. 4 Wms. & White, m.d. Centering machine, P&W. 4" 2 spdl., b.d. Crane, 5 ton O.ET., 43'6" span, m.d. Column facer, 69" dia. Espen Lucas, b.d. Cutter paper 23" Chandler & Price, blade 27". Cutter paper 44" Brown & Carver semi-auto., m. d. Die flier, Rearwin, tbl. 18"x17", str. 8" Drill, mult. 16 spindle D-12 Fox, b. d. Drill, radial 2" Mueller, t.a., m. d. Drill, radial 2" Mueller, t.a., m. d. Drill, No. 35 Foote-Burt 36" heavy duty, s. p. d. Drills, upright, 11" og 15". B. & E., m. d. Gear cutter, spurt 46" x19" S. & E., m. d. Gear cutter, spurt 46" x19" S. & E., m. d. Gear cutter, spurt 46" x19" S. & E., m. d. Gear planer, 36" Gleason, bevel, m.d. Gernder, c.10 to KW Jeffrey, d. c. 250 v. b. d. Generator, 100 KW Jestinghouse d. c., 125 v. b. d. Generator, 100 KW Jestinghouse d. c., 125 v. b. d. Grinder, c.10 While 5" 14", m.d. Grinder, dis. No. 6 Gardner, 10 H.P., m.d. Grinder, dis. No. 6 Gardner, 10 H.P., m.d. Grinder, dis. No. 6 Gardner, 10 H.P., m.d. Grinder, only. Wills 6" yes Worton, m.d. Grinder, control, 100 kW Jestinghouse d. c., 125 v. b. d. Grinder, v. v. Wells 6" yes Worton, m.d. Grinder, v

Press, end wheel Stiles-Parker, stroke 14".
Press, end wheel No. 3 Biiss, roll feed, m.d.
Press, 290 ton Baldwin Southwark 4-poat.
Press, 290 ton Baldwin Southwark 4-poat.
Press, foot, No. 2 Swaine, bed opening 6" 174".
Press, foot, No. 2 Swaine, bed opening 6" 174".
Press, foot, No. 2 Swaine, bed opening 6" 174".
Press, hydr. Woods 1000 ton, platen 42" x8"
Press, hydr. Woods 1000 ton, platen 42" x8"
Press, hydr. Woods 1000 ton, platen 42" x8"
Press, bydr. Woods 1000 ton, platen 42" x8"
Press, bydr. No. 3 Toledo, stroke 14".
Press, o.b.i. No. 3 Toledo, stroke 14".
Press, perforating, No. 51 V&O, str. 4", dbl. crk.
Press, straight side No. 59 Bliss, stroke 5".
Press, straight side No. 59 Bliss, stroke 6".
Press, straightening, 30 ton Manley, lever action.
Press, straight side No. 69 Toledo, stroke 8".
Punch, No. 60 Toledo, stroke 9".
Punch, Mo. 10 Toledo, stroke 9".
Punch, No. 10 Toledo, stroke 9".
Punch, No. 60 Toledo, strok Press, and wheel Stiles-Parker, stroke 14". Welders, 150 amps, and 200 amps, portable. Welder, 200 amp, Lincoln, 4-cyl. gas engine, Wire straightener, 4" Schuster, 4' cut-off, b. d.

Chas. T. Hamilton Machine Shop 325 N. Jackson St., Decatur, Ill.

Drill, press, 20" Champion upright, m.d., b. g. twelve large drills, all new, \$250. Engine lathe, 18"x8" Boye & Emmes, q.c. taper mot,

Shaper, 20" Ohio, motor drive, \$1350.

The Reeve-Fritts Company 28 N. Clinton St., Chicago

Drill head, U.S., 4 spdl., 14" cap Grinder, Lumsden face, 12" cup. Grinder, tool, Gisholt lathe & planer, Pipe mach., 2 spdl. Murchey, 2" cap. Woodworker, 4 in one combination.

FOR SALE BY

H. H. Pelz Machinery Co. 5140 Woodlawn Ave., - Chicago, Ill.

Drill, 5' Niles universal radial, gear box, s. p. d. Drill, 5' Niles universal radial, gear box, s, p, d. Drills, 12 spindle multiple, (3). Lathe, 8"x80" Lo-Swing, all geared head, s. p. d. Slotter, 18" Niles, 30" table diameter. Turret lathe, 28" Pond, 6" hole in spindle, m. d.

North Machine Tool Corporation 179 Lafavette St., New York, N. Y. WOrth 4-5690

Automatics, Clev. model B \(\) and \(\) ", (3).
Automatic die cutting mach. Keller w. 2 motors.
Automatic thread cutting labe, B ridgeport.
Drill, \(\) spl. superspeed b.b., Foadick 13", \(\) " cap.
Drill, \(\) spl. superspeed b.b., Foadick 13", \(\) " cap.
Gear gen. 18" Gleason straight bevel, s.p.d.
Grinder No. I Cincinnati univ. tool. Grinder No. 1 Cincinnati univ, tool.

Grinder, No. 295 Rivett internal w. 2 motors.

Grinder, No. 12 Brown & Sharpe, plaincyl.

Grinder, 10, 12 Brown & Sharpe, plaincyl.

Grinder, 13° Pratt & Whitney bench.

Lathe, 14".8° Monarch, q.c.g.

Lathe, 18".8° Sidney, q.c.g.

Lathe, 18".8, Monarch, q.c.g.

Lathe, 18".8, Monarch, q.c.g.

Miller, No. 2. A Becker vert., w. motor.

Millers, No. 2 Wabeek swivel hd., univ., (2 new).

Miller, No. 2 Wabeek swivel hd., univ., (2 new).

Miller, No. 2 Wabeek swivel hd., univ., (2 new).

Shaper, 18" Gould & Eberhardt, (2).

Shaper, 26" Gould & Eberhardt, (2).

Shaper, 36" Ohio.

Turret lathe, 2"x34" Jones & Lamson, grd. head. Snaper, 36 Onio. Turret lathe, 2"x24" Jones & Lamson, grd. head. Turret lathe. Potter & Johnson No. 6A, s.p.d.

FOR SALE BY

The Nutmey State Machinery Corp. 1041-1051 State St., New Haven, Conn.

Drill press, Henry & W. 6 spl., class B,12" overhang.
Drill press, Leland Gifford, 6 spdl., p.f. to each spdl.
Grinder, Diamond auto. surface feed, 72" table.
Grinder, Landis No. 2 universal.
Grinders, Bryant No. 39, m.d. internal chucking, (2).
Header, Wat. Farrel No. 24—(5/16") dssd, No. 1 ball misd. Miller, Brown & S., No.13B production. Reheader, Wat. Farrel No. 2\(\frac{2}{2}\) — (\$/16" cap.) dssd. Thread miller, Lees Bradner No. 3C, with 9 collets, 6" hole in spindle. Thread miller, Pratt & Whitney, 6"x45".

Davis Machinery Company 1-3-5 St. Clair St. Toledo, Ohio

1-3-5 St. Clair St.

Drill, & spindle Avey h. s. b. b.
Gear cutter, 48" x12" Gould & Eberhardt, s.p.d.,
Gear cutter, 80" x12" Gould & Eberhardt, s.p.d.,
Gear cutter, No. 3-36" Brown & Sharpe, s.p.d.,
Grinder, No. 6 Besly, dbl. spdl., dlac.
Grinder, No. 6 & 104 Beyant chucking. b.d.,
Grinder, No. 6 & 104 Beyant chucking. b.d.,
Grinder, No. 23 Brown & Sharpe int. cyl.
Eeyssates, No. 8 Belse & Merrill, b.d.
Eyssates, No. 18 Beyange, Merrill, b.d.
Lathe, 12" 254" Gleason, st. c. gear.
Nibbler, No. 118 Savage, cap. 8" throat 18".
Press, No. 90-D Toledo, dbl. crank, m.d.
Press, No. 95-Toledo, dbl. crank, gd.
Press, No. 91-C Toledo, dbl. crank, gd.
Press, No. 90-C Toledo, dbl. crank,

West Penn Machinery Company

West Penn Machinery Company
Air compressors, 30 to 2500 cubic feet,
Blue press, paper, Log emann, b.d.,
Blue print machine, 46" a. c., 16 volt.
Brill, No. 3 Thiel, m. d.
Drill, sharpener, Ing. Rand "Leyner", 18".
Drill, print 14" to 36".
Drill, winster 3", b.d.
Brill, winster 3", b.d.
Brill, Minster 3 Air compressors, 30 to 2500 cubic feet,

1210 House Building. Pittsburgh, Pa.

Lathe, roll, 54"x26' std., m. d.
Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, shaper, duplex, No. 14 Cochrane-Bly, m.d.
Miller, vertical, Burke, table, 16x6, b. d.
Miller, vertical, Burke, table, 16x6, b. d.
Miller, vertical, Burke, table, 16x6, b. d.
Miller, No. 1 Campbell 3/16", 6" gap, m. d.
Nibbler, L. & A., 4", -38" throat, m.d.
Pipemche, 2", 4", 6", 8"12"&18" Landis-Oster-Williams,
Press, arch, No. 30 Bliss, b. d.
Press, arch, No. 30 Bliss, b. d.
Press, No. 19 Bliss o.b.i., b.d.
Presse, No. 19 Bliss o.b.i., b.d. rress, No. 59 Toledo, 8" stroke, m.d.
Press, No. 19 Bliss o. b.i., b.d.
Presses, Stiles, type, 13 and 38" m. d.
Presses, Stiles, type, 13 and 38" m. d.
Press, knuckle joint, 75 ton Howard.
Punch, comb, 35-1J Buffalo, m.d.
Punch, No. 5 L&A. 4" b.d.
Punch, No. 6 L&A. 4" b.d.
Punch, horiz, 1"-1" Cleveland, m.d.
Pump, 1596 lb. Triplex wert, 13 gal., m. d.
Riveters, air, hammer, spinning.
Saw, hack 546 Racine, b.d.
Shapers, 18" 20" 24" & 36" Gould & Eberhardt,
Shears, 18', 20" 24" & 16" Gould & Eberhardt,
Shears, 19', 12" Actua, m. d.
Shears, 19', 14 g.s. Niagras, m.d.
Siotter, 12" Putnam, b.d.
Straightener, McKay 17 roll, 4" dia., m.d.
Testing machine, 469,000 lb. Riehle, b.d.
Tumbling barrel, 34" x45", belt drive,
Upsetters, 1" to 6"
Woodworker, universal Parker, m. d.

FOR SALE BY

Chas. W. Stone Co.

706 Sixth Ave. So., Minneapolis, Minn.

Rebuilt by Mach. Tool Mfg. Brake, No. 98" Dreis & Krump, hand. Grinder, No. 55 Heald internal, m.d. Ormorer, 100, 50 freata internat, m.c., Milling mach., No. 24 Rockford, pl., sgl. pul, dr., m.d., Milling mach., No. 24 Rockford plain, m.d. Milling mach., No. 3 Kempsmith, plain, m.d. Milling mach., No. 3 B, B,&S, h.d., plain, sgle. pulley drive, m.d

Milling mach., No. 3 LeBlond plain, m.d. Milling mach., No. 4 LeBlond plain, m.d.

Joseph Hyman & Sons, Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK POWER PRESSES No. 182D Cleveland, double crank, 76", crank 4". No. 182D Cleveland, double crank, 76", crank 4", No. 204A Toledo, double crank, gap.
No. 4 United Eng. & Fdry., 4 crank, 166" between uprights, 8" dia. crank 78" stroke, weight 118600 lbs.
No. 6 B Ningara, dbl. crank 36", crank 38",
No. 5 126 Ferracute, dbl. crank 124", crank 78"—9",
No. 5 125 Ferracute, 401. crank 124", crank 78"—9".
No. SG 83 Ferracute, 46", 109 tons cap.
No. 5182 Ferracute, 52", 9" crank.
No. 25 12 Ferracute, 52", 9" crank.
No. 2115 Hamilton, the Tod., 500 tons cap.
No. 128 Bluettraghe double crank, t. r. No. 407-84 Bliss, toggle, double crank, t. r. No. 497-54 Bliss, toggle, double crank, t. r.
No. 18, 34C Bliss toggle presses.
75 ton £51 Ferracute, knuckle joint.
No. 2 & 12 Standard auto drops.
No. 9C Badger State combination punch & shear.
No. 6 Hilles & Jones multiple punch, ram 100".
Presses, Waterbury-Farrel 6 plunger with cartrelip dies, weight each approx. 18,000 lbs., (2).
Punches & shears, single & double end.
Squaring shears, various sizes.
These and hundreds of others of popular makes cartridge These and hundreds of others of popular makes and

FOR SALE BY

D. E. Dony Machinery Co.

47 Laurelton Rd., Rochester, N. Y.

Gas cutting machine, No. 7 Oxygraph. Buffers. 3 hp., d.c. Lathe, \$2"x8' New Haven. Shaving machine, Pratt & Whitney. Tablet machine, No. 42 Colton, m.d.

Failor-Strafer Machinery Co. 880 Bergen Ave., Jersey City, New Jersey

Blue print drying machine, 42" Paragon,
Drills, 3' American sensitive radial.
Flanging machine, No. § McCabe.
Keyseater, No. 3 Mitts & Merrill, b.d.
Keyseater, No. 3 Mitts & Merrill, arr, for m.d.
Lathe, turret 24" Davis, heavy duty.
Lathe, turret, 24" X10" Lodge & Shipley, h.d.
Lathe, 33" x13" Punam.
Lathe, 33" x13" Pyond engine, triple geared.
Lathe, 14" 36" Reed Prentice g.h., single pulley dr.
Pipe thread, mach. 4" Bignall & Keeler, p.d.q.c., md.
Press, No. 1 Bliss toggle.
Screw machine, No. 12\footnote{\text{S}} S. G. Garvin.

Standard Machinery Co., 347 Indiana Ave. Grand Rapids, Mich.

Cut-off, abrasive, Tannewitz type M-2.
Drill, 28° W.F. & J. Barnes, sliding head,
Drill, 40° Nsw Haven No. 5, sliding head,
Grinder, cylinder, Heald No. 53.
Hammers, rivet, Grant No. 2 and No. 2.
Keyscater, No. 9 Mitts & Merrill. Keyscater, No. v mattis & merrili. Lag screw pointer, Pawtucket. Lathes, mfg., 12"x6' Pratt& Whitney, (2). Roll former. Kane & Roach, 2 sets spindles, Tapper, Anderson No. 40 Dial Feed Auto. Welder, Expert Portable spot, 50 KVA.

FOR SALE BY

Dallas Machine & Engineering Works,

sizes, are in stock at our warehouse here. Rebuilt and Guaranteed.

Arbor press, 12" Barnes. Screw & ratchet feeds.
Axle lathe, N-B-P 8' bed, D. C. center drive.
Bolt threaders, 14" Acne, b. d., 25 sets of dies.
Boring bar, 64" bar for eng. cyls. 6" depth.
8" Marvel, cap. 3" to 6".
Boring mills, 48" N-B-P wertical car wheel.
Drill presses, 14" Leland Gifford b. b. No. 2 M.T., ar-Drill presses, 14" Leland Gifford b. b. No. 2 M.T., arranged for motor drive.

20" Barnes, hand feed, arr, for m. d.

21" Champion, back geared.
Gear hobbers, 24" Gould & Eberhardt.
Grinders, 12" Trinity univ. mfg., complete.
Hammers, 800 lb. Niles steam.
1800 lb. N-B-P single from the seam.
Horizontal punch, No. 2 milles & Jones, 84" throat.
Lathes, 10" 248 Greaves-Klusman, c. d., arranged for Latties, 15 'xte 'Greaves-kinsman, c. d., arranged for motor drive, t. a. 16"x8' American, c. d. turning. 28"x16' Bridgeford, c. d. 18"x12' Schumacher-Boye-Emmes, q. c. g., taper at-18"x12" Schumacher-Boye-Emmes, Q. C. g., taper ar-tachment, d. b. g.

18"x6" Reed dry geared bead,
Punch and shear. No. 3 L. & A. double end, b. d.
Radial drills, 4" Bickford, No. 4 M. T., arr. for m. d.
Radial drills, 4" Bickford, No. 4 M. T., arr. for m. d.
Rolls, 42" Lown, 2 speed slip roll former, d. h.
Saws, 30" Clark, metal band, 3 speeds.

5219 Maple Avenue, Dallas, Texas

Shaper, 20° G. & E. back geared.
Shears, 30° Excelsior squaring, 18° gauge,
No. 4B Doty, hand.
Threaders, 18° Landis double spindle, pipe & bolt.
30° Landis single spindle, pipe & bolt.
WOODWORKING MACHINERY
Wellseningslave, 2 h. 23° a. 6, 3 phase mot

WOOD WORKING MACHINERY
Wallace universal saw, 2 h p., 220 a. c. 3 phase motor.
Beaver cut-off saw and rip saw.
No. 147 Hall & Brown vertical hollow chisel mortising
machine, compound table having rack and pinion
feed, T. & L. pulley.
Smith-Phillips frame machine.
Fay & Egan single spindle b. b. shaper.
Greenlee No. 602 sash clamp machine.
20" Wood lathe mounted on 16" wood bed, w/head and
tailstock, 3 centers, 2 rest stands, 2 rests, 2 face

20" Wood lathe mounted on 16' wood bed, w/head and tailstock, 2 centers, 2 rest stands, 2 rests, 2 face plates, 3 speed transmission, V-belt drive. New Britain chain mortiser, compound table, p. f. HVV. DUTY WOODWORKING MACHINERY No. 125 Fay & Egan boring machine, six spindles. No. 124 Fay & Egan boring machine, six spindles. No. 184 Fay & Egan mortising machine: excellent for planing, matching and surfacing lumber. Will tongue and groove. Capacity 2":12".
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mortiser.

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Pattern shop equipment complete.

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Lathes, precision bench, Stark, Elgin,
Lathe, Rivett, with turret slide attachment,
Miller, No. 1V Brown & Sharpe, plain,
Radial, 3⁹ Carleton sensitive, belt, high speed,
Shear, Quickwork, No. 16A, 66° x14 gauge.
Spot welder, 12 kw Gibb.
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#" Schuster wire straigt. 250 ton hyd, wheel press. 24"x5' Pond planer, 1 hd. 32"x14' Niles planer 1 hd.

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6x14" Pratt & Whitney Thread
24"x24"x26" Ingersoil Planer Type
36"x36"x14" Bement Slab, m.d.
40" Ohio Titled, md.
SHAPERS

16" Hendey Friction Type 28" Ohio, gear box, m.d.

32" Morton Railroad Type Draw Cut, m.d. PLANERS

30"x30"x8' Cincinnati, 1 head

15" Niles Bement 18" Bement 84" Newton Vertical No. G16, m.d. GRINDERS

Cincinnati Valve Seat Grinder, 2 m.d.
No. 4 Brown & Sharpe Universal
No. 10 Bryant Internal
No. 50 Heald Cylinder, hydraulic
No. 55, 60, 65 Heald Cylinder, mechanical No. 55, 60, 65 Heald No. 1 Fraser Lapper 54" Bridgeport Knife

PLAIN CYLINDRICAL GRINDERS
"No. 14 Brown & Sharpe

10x18 10x24" Landis, m.d.

10x24" Landis, m.d. 10x36" Norton, m.d. 10x30" Queen City, m.d. 10x36" Landis Integral Cam, **m.d.**

10x50" Norton, m.d. 10x52" Landis, m.d. 10x72" Norton, m.d. 12x36" Cincinnati, m.d. 12x36" Cincinnati, belt

12x36" Modern, m.d. 12x42" Landis, belt 12x48" Modern, m.d. 14x50" Norton, m.d.

14x50" Norton, m.d. 16x52" Landis, m.d. 18x72" Cincinnati Automotive Parts TURRET LATHES AND SCREW MACHINES

average Laines and SCREW MACHINES 18" Libby Type A, m.d. 24" Gisholt Model I, tilted turret 24" Gisholt, cross sliding turret 2 spindle 3x36" Jones & Lamson, chucking 3x36" Jones & Lamson, bar

2 spindle 3x36" Jones & Lamson, 3x36" Jones & Lamson, bar 3x36" Jones & Lamson, chucking 3¼4x40" Greenlee, bar

Woods Tilted Turret, cone ENGINE LATHES

13"x6' Willard 15"x6' Willard 16"x8' Greaves-Klusman 16"x12' Barker 20"x10' Pond

10 Al. Burket
20"x10" Pond
21"x12" Bradford
22"x13" Niles
22"x16' centers (22' bed) American 100 HP
Input Super Lathe, geared head, with
100 H.P. D.C. main drive motor and a
additional D.C. motors, weight 65,000
Ibs. latest type
22"x18" Niles
22"x18" Niles
24"x86" Bridgeford
24"x10" Bridgeford
24"x11" Chard
24"x11" Chard
24"x11" Schumgcher-Boye

24"x16' Schumacher-Boye 24"x18' Greaves-Klusman Geared Head

Many other machines in stock.

THE EASTER

1001 TENNESSEE AVENUE.

MACHINE TOOLS

26"x16" Bridgeford 30"x14" Hamilton

RADIAL DRILLS

21/2' Avey Sensitive 3' American Sensitive 3' Carlton Sensitive 3' Carlton Sensitive
3'1/2' Mueller Plain,
4' Fosdick Plain, gear box
4' Hammond Jack Knife
5' American Plain, gear box
5' Fosdick Plain, m.d.
51/2' Niles Semi-Universal Niles Full Universal, gear box

WELDERS

200 amp. Lincoln Stable Arc 300 amp. General Electric 800 amp. Lincoln Stable Arc 300 amp. Hobart with Chrysler Engine

PRESSES

Waterbury-Farrel S.C. Waterbury-Farrel D.C. Ferracute 2 Ferracute P2 Ferracute
No. 6 Waterbury-Farrel D.C.
SSI Ferracute D.C.
No. 2684/48 Toledo D.C. Toggle Drawing,
weight 175,000 lbs.
No. 496D Toledo D.C. Toggle Drawing,
weight 160,000 lbs.
No. 0 Springfield Bench Type Straight.
80 ton Lorrie Hydraulic, type BX
Metalwood Hydro-Pneumatic B33
Metalwood Hydro-Pneumatic B45
00 ton Caldwell Hydraulic Wheel Press
Care

"Avey Milband Cut-off 3" Newton Cold Cut-off 40. 2B, 6 Cochrane-Bly 10. 15 Lea Simplex Cold nowlton Cold, 24" blade x6" Racine Hack x6" Racine Hack 0x10" Kelley Hack, new (2 in stock)

MISCELLANEOUS

isholt Precision Balancing Machine, m.d. Torton Running Balance Indicating Macorton Running Balance Indicating Michine, m.d.
Io. 5 Williams & White Bulldozer, belt
50 H.P. Sprague Electric Dynamometer
Io. 22 Williams & White Eye Bender
Io. 22 Cochrane-Bly Filing Machine
Io. 1 Fischer Oil Groover
Ilevney Polishing Machine roduction Polishing Machine reduction Folsoling Machine Vagner Saw Sharpener o. 11, 11S Cochrane-Bly Saw Sharpeners o. 1 Leighton Type Straightening Machine (new)
. %" Shuster Wire Straighteners

TOOL & CUTTER GRINDERS
o. 3 Brown & Sharpe Cutter & Regmer

Let us quote on your requirements.

No. 4. 5. 31 Oliver Motor Driven Drill Pointers No. 23 Brown & Sharpe Gear Cutter Gisholt Universal Tool Gleason Cutter Gould & Eberhardt Gear Cutter Modern Chaser Yankee Drill

AUTOMATICS %-1/2" Cleveland Model B, m.d. 4 spindle %" Cleveland Model M, m.d. %" Model A Cleveland 11/4" Cleveland Model A 11/4×11/2 11/4" Ho " Cleveland Model B Hartford No. 6D Potter & Johnston for brake drum work No. 5A Potter & Johnston

9/16" 2 spindle London

1" 2 spindle Acme, cone 1" 3 spindle Acme, cone l" Landis, cone 2" Landis, cone 21/2" Acme, cone No. 118 Rickert-Shafer Auto. Threading Machine, m.d. American Bolt Header

BORING MILLS

30" Colburn, I turret head 48" Niles Car Wheel Borer, 51/2" Bement Horizontal, m.d.

BROACHING MACHINES Cincinnati Mill Broach, m.d., new No. 2 LaPointe of Hudson, belt No. 2 I. N. LaPointe, m.d. No. 3 I. N. LaPointe Double, belt No. 4 I. N. LaPointe, m.d.

RIVETERS

No. 2A, 3A High Speed Riveting Hammers 1/4" Shuster, belt Hanna Air Riveter, 13" throat Chicago Pneumatic, 24" throat BALL BEARING DRILLS

2 spindle Henry & Wright 3 spindle Avey Offset type 3 spindle Barr 3 spindle Cincinnati Pulley Machy. 4 spindle Allen 4 spindle No. 2 Fosdick, p.f. 4 spindle Gardam 4 spindle Gardam
4 spindle Henry & Wright
4 spindle Kokomo
6 spindle Henry & Wright
7 spindle Barr
1 spindle Henry & Wright
1 spindle Leland & Gifford
1 spindle Sigourney

Mason Bench Type

ACHINERY CO., CINCINNATI, OHIO

IF WHAT YOU WANT ISN'T HERE

BRAKES:

8'-18 ga. Chicago Steel, New

DRILLS:

Hisey Wolf No. 28 Electric \$" 842.50 Van Dorn, 14" Electric 110 V. \$50.00 350.00
Radial, Sena. 3 ft, American
Prentice, 4-spdl, high-speed
Allen BB Type B sgl, spdl,
Allen 3-spdl, BB, cap. 1"
14" U. S. 235.00
20" Stibley & Ware B.G., P.F.
20" Barnen B. G. & P. F.

FORGING MACHINES:

Two 21" Ajax; estd. wt. 47,000 lbs. each

GRINDERS:

Angle Plate, Clark & Cincinnati Disc, No. 6-20 Besly Dbl. Spdl. Flex. shaft, RA 5 Haskins Emery, DE, Norton 24" Emery, DE St. Louis 18"&20" Plain & Surface, No. 1 La Salle Surface, No. 1 La Salle, Wet tool, Springfield, 27" wheel

LATHES:
26"x14" Niles, PCG
20"x8' Bradford, PCG MD.
14"x6' Rumsey, PCG
14"x8" Carroll-Jamieson
10"x42" Atlas, bench type,
H-42, 1/3 HP. 110 V m motor

LATHES—Turret: 12" Reed-Prentice BG

PRESSES: PRESSES: Arbor, Famco and Atlas. Arch, Bliss 36-A Grd., M.D. Cam Drawing, 69-N Bliss Foot, Famco and No. 4 Swaine No. 2 L & J. O.B. I. New (2) Punch. No. 5 Bliss Stiles Grd. No. 20 Excelsior 4" in 4"

PUNCHES & SHEARS: SE W-W 14½, 25" thr. 1 in 1" Rock River L, 24" thr. ½ in ½" DE 1-10 Badger ½ in ½", 10" thr.

SAWE: Cold, Higley, 20" saw, No. 17 Cold, Higley, 18" saw, No. 14 Hack, No. 3 Robertson 6x6" Hack, No. 14 Atkins 6x6" Wells No. 5 & S, Band, Metal

SHAPERS: 26" Hendy planer type dr.

Send Us Your Inquiry

SHEARS:

Dbl. action, No. 11 Excelsior, inside cutting, cap. 12 ga.
Rotary Bevel, Lennox in Slitting, Rotary Niag., cap. 4"
Throat 16" Throat 16"
Square, 36"x18 ga. Pexto Foot,
New (3)
Square, 30"x18 ga. Ditto
No. 1236 Libert, 12 ga. 36"
throat M.D. (New)
Throatless, 18 H Marshalltown

THREADERS, Pipe & Boit:

Pipe, 2" Oster No. 302

MISCELLANEOUS.

Chucks, Lathe 4-jaw Ind, 8" to

Compressor, Herron-Bury CCB, 14x9x8", 6' tank, 20 HP mtr. Hammer, 50-lb. Little Giant, Jacks, Lever Lift, 15 ton Joyce-Gridland; Simplex; 10-ton Barrett

Barrett
Lathes, 30" spinning
Miller, Becker 7H, Lincoln type
Roll, Corrugating, 10" Robinson
Tappers, St. Louis & Garvin
Welders 21, 5, 71, 10 K W
Dyer spot
Vaive Refacer, 4" Black & Decker

Brown Mchy. Co., 2333 N. Ninth St., St. Louis, Mo.

Air Compressors, Vert. 21 & 87 CFM.

Boit Threaders, 14" National, 1 Head, B.D.

Die Heads, 1" & 13" Geometric
Die Heads, 24" National-Acme

Keller Die Sinking Machines—"E" (2)

Drill, 2-spdl. Rockford, No. 2 MT, with T.A.

Delli, 26" Barnes S.H., B.G., P.F., No. 4 MT Delli Radial, 34' Prentice, G.B., S.P.D. Furnace, Electric, 1000 lb. Swindell Grinder, 12" belt, Surface, 2 H.P. 2/60

Grinder, Internal No. 23 Baxter, 17" spindle Grinder, Internal, No. 55 Landis, M.D. Hack Saw, 6", No. 2 Economy, M.D. Hammer, Steam Drop 1000 lb. Chbg., D. F. cyl. 8" dia. x 42" str.

Hammer, Steam Drop, 2500 lb. Erie Holst, 2-Ton American, 2 motors, 3/60/220 Keyseater, No. 3 Mitts & Merrill, belted Lathe, 12"x6' Blaisdell, Motor 1/60

Lathe, 15"x6' Prentice, Motor 1/60 Lathe, 22"x12' Porter, 5 step cone, 18" chk. Motor, 10HP. C-W. 230 V. DC., 1400 Rev., (new)

Moulding Mach., Hand, flask 13x18" Pipe Cut-Off Mach., 2" Murchey, 8.P.D. Press, No. 3 Toledo, OBI, stroke 14"

Press, No. 18 Bliss OBL Motor 3/60 Press, No. 2 Manville, Pillar, 1500 lb.

Press, No. P3 Ferracute, Punch, str. 13" Press, Wells, Punch., str. 14", Wt. 2500 lb. Press, Foot, No. 18 Famco, on stand Press, 30-Ton Lourie, Hand, Hydraulic

Punch, S.E., No. 7 L.&A., 4" tht., belted md. Punch & Shear, hand, No. 679 Pexto Punches, gang 36" No. 6 Niag.; 48" Bertsch, M. D.

Reamers, 34", 44", 4-5/16" adj. HS. Reamers, 54" Adj., HS. Kelly

Riveter, 2-A High Speed for M.D. 6"x6" Robertson No. 2, Motor 8aw, Hack, 1/60/110

Shaft Straightening Mach., No. 3-A Grier Hand Shaper, 14" Steptoe, S.B.G. Motor 1/60 Shapers, 16" Kelly-Smith & Mills, S.B.G. (2) Shear, Rotary No. 15-A Niag., circling attach. Shear, Square, 42"x16 ga. Pexto, 222, M.D. Taps, Collapsible, 1½", 2", 24", 2½", 3½"
Threading Mach., Auto. 2" Rickert-Shafer, boring & Chamfering tools, M.D.

Welder, Arc. 150 Amp. Lincoln 2/60/220 Welders, B Butt 200 & 300 KW. Winfield 60

LBREATH MACHINERY

306 Empire Building

Pittsburgh, Pa.

To Work For Victory * * * * * THESE TOOLS NEED YOU... YOU MAY NEED THESE TOOL

DRILLS

21" Cinc. Bick. Box Col. Prod., m.d. 6 m., p.i. to spdl., 2 Ruhr adj. hds. Fox Mult. Spdl. with

tap. att. (6) Kingsbury 4 spdle., auto. index device 21" Rockf. Drills (2) 21" Minster Drill Natco Rotary Drill 6-spindle

6-Spdl. Moline Hole Hog, m.d. 5-Spdle. Detroit 2' Gang Radial, No. 4 Morse Taper Foote Burt Mult. Sp.

Drill m.d. (5)
GEAR EQUIPMENT GEAR EQUIPMENT No. 36ST Gould & Eberh. Gr. Gash. No. 5A Lees Brad-ner Hobbers (3) W. & W. Gr. Cutter, 96" dia. x 52" fa.

GRINDERS 10"x18" Nort. Grdr. p.i., m.d. & m. No. 84A Gardner

Grinder Nos. 55 & 60 Heald Internal

No. 1 Osterholm fa. No. 126 Gardner dbl. spdl. hyd. fd. No. 20 Bryant Int. 16" x 38" Cinc. Pl.

Cylinder Type WC Hammond Snagging Grinder LATHES "x12" Porter Cable

Lathe 12"x5' Pratt & Whitney Lathe, m.d. 34"x11' Wickes

Crankshaft, (2) 13"x6' Sebastian Lathe, Q.C. Grd. head, m.d. 6 m. 21/4x24 Jones & L. Flat Turret 3x36" Jones & Lamson m.d. 6 m. 20"x12' Hendey,

q.c.q.

SLEEPER A MARTLEY SPRING COLLERS No. 25 Sec. 332 Univ. Clutch, Type, m.d. (2) No. 15 Sec. 346 Univ. Clutch, m.d. 4 mtr. No. 1 Series 288 Universal Segment, Type No. 3 Ser. 261 Univ. Segment Type, mtr. dr. No. 35 Sec. 424 Univ. Segment, m.d. 4 mtr.

JUST RELEASED FOR IMMEDIATE DELIVERY

No. 93-C-48 Toledo D.C. presses, sh. height, str. 10", M.D. & M. (2) No. 254 Dr. & Kr. Press Brakes, M.D. & M., 60"—16 Ga. (10) No. 34 Williams & White D.C. gap frame Press, 7½" cr.

PRESSES

PRESES
No. 3A Bilist O.B.I.,
str. 12 M.D. &
str. 12 M.D. &
No. A4 Niag. OBI.,
Str. 34 M. M.B.,
No. A5 Niag. OBI.,
Str. 44 M.D. &
No. 44 Toledo, O.B.I.,
A Toledo, O.B.I.,
A Toledo, O.B.I.,
No. 3A Bilist Horn.,
str. 34 A. Str. 24 M.D. &
No. 24 STR. 20 M.D. &
No. 25 STR. 20 M.D. &
No. 26 STR. 20 M.D. &
No. 27 STR. 20 M.D. &
No. 28 STR. 20 M.D. &
No. 29 STR. 20 M.D. &
No. 29 STR. 20 M.D. &
No. 2

WELDERS

WELDERS
Multi-Hydromatic (2)
Fedt. Welder, 28 K W
Ford Spot, 40 KVA,
m.d. 4 m.
Taylor Winfield Spet,
33 KVA, Type 5184
Agnew Spot, Type
10-D, (2)
Federal Spot, 40 Kw,
Type 4208, (2)
Type 5-384
Taylor Spot, 47 Kva,
Type 5-384
Taylor Winfield Spot,
15 KVA, Type
12-2
Taylor Winfield Spot,
Taylor Spot, Taylor Spot,
Taylor Winfield Spot,

12-2
Taylor Winfield Spot,
20 KVA, Type N6-2; m.d. & m.
Federal Butt, 45 Kw,
Type GAA
Federal Butt, 65 Kw,
10A, m.d. & m.
Federal Butt, 35 or
40 KW, m.d.

RIVETERS Thomkins John., Mod. (3) (3) Chgo., No. 14-68, m. d. & m., (3) Grant No. 120, m.d.

& m. Penn, Style C-22, md. Chicago, size 9/64 ROLL FORMING MACHINES & CUT-OFF MACHINES Yoder 8 spdle., m.d.

& motor Yoder Tube, Yoder Tube, 14 sp. m.d. & m. Yoder Cutoff, with M TR, Type LC (2) 14 10. BULLDOZERS

No. 23 Williams & White, m.d. & m.
No. 22 Williams & White, m.d. & m.
No. 2 Williams & White, m.d. & m.
No. 4 Williams & White, m.d. & m.

TUBE BENDERS Williams & White, m. d. & m., (5) MISCELLANEOUS

MISCELLANEOUS
Bostitch Stitch Mch.,
Type No. HA. m.
d. & motor
Buffer, Udyma. Auto,
m.d. & m.
Die Press, Seelye,
Style A.
Drill, 15" Barnes,
m.d. & m.
Tackers, No. 4 Heller,
foot operated

Ross Clinch Nut Mch, 8-1, m.d. & m. Mill, Burke Hand, m. Punch, Niagara drive

MILLS

No. 3 Craftsm. Rot. Production Ingers. Rotary, 3 hd., m.d. 68" Newton Rotary,

motor driven Trundle Thread Mill Ingersoll Mill

WELDERS

150 KW Fed., m.d. Taylor Win. 4-way flesh 150 KVA Fed. Seam Walder

MISCELLANEOUS

Automatics, %"
Model G Gridley Balancer, Gisholt Dynam. (2) Balancer, 18" G holt Static (2) holf Static (2)
Boltcutter, Nat'l. 2spdle., 1½" cap.
Broach, 6-ton Amer.
Vert. Hyd. m.d.
Bulldozer, No. 5
Williams & White
Core Blowers, No. 6 Demmler, (3) Furnace, Gen. Elec., 15 KW., 110 volt Hammer, Bradley 15 lb. wick (4)
Shear, Pels Comb.
m.d. I beams 6"x
12" Slitter, 42" Yoder Trucks, Elwell

Parker Elec. Mule

Parker Elec. Mule 3 ton Auto. Hi-Lift Upsetter, 1½" Acme Steel Bed Upsetter, 1½" Aiax Wire Strnrs., 3/16" Shuster to 20' X-Ray Mach., Gen-Elec. 250,000 V. cap. 2%" solid steel

steel No. 2 Manville 4 slide machine

WRITE . WIRE OR PHONE

9656 FRENCH ROAD, DETROIT, MICH.

PHONE: PLAZA 1151

"INTERSTATE

CLEARING CRANKLESS TRIPLE ACTION PRESS

4 Point Suspension Type Combined capacity blankholder and plunger slide 1350 tons Bed 84"x133"

PRESSES—STRAIGHT SIDE No. 59 TOLEDO, 12" Stroke, 25" die space M.D., Spring cushion; Tie rod No. 58 TOLEDO, 8" stroke, 18" Die space, Tie rod, Belt Drive

PRESSES-DOUBLE CRANK

NO. 97-H TOLEDO DOUBLE CRANK—Distance Between Housings 173"; Bed area 60"x173"; 10" stroke; approx. 650 tons; Weight 245,000 lbs.

ALL MOTOR DRIVEN—TIE ROD
No. 60-D-94 CLEVELAND, 16" str.; 6" shaft;
Bed 48x8"; D. B. G.; 16" Die space
No. 154G CLEVELAND; Back geared
No. 54-G 6 No. 95-G TOLEDOS
No. 934½-F TOLEDO, 6" str.; Bed area 36"x56"
No. 934; TOLEDO, 12" str.; Bed area 32"x54"
No. 93-E TOLEDO, 12" str.; Bed area 32x50"
No. 205-E TOLEDO, 8" str.; Bed area 32x50"
No. 205-E TOLEDO 6" str.; Bed area 32x60"
No. 205-E TOLEDO Gap Frame B.G., 4" Stroke;
Rea 72"x52" Bed 72"x26"



PARTIAL LISTING OF STOCK ITEMS

AUTOMATIC SCREW MACHINES 5-No. 00 Brown & Sharpe Turret Formers

BORING MILLS VERTICAL: 72" BICKFOF BEMENT POND, 52" KING BICKFORD,

BULLDOZERS NO. 8 WILLIAMS & WHITE, Cross head 15" high and 72" long; No. 2 Williams & White RYERSON KLING DOUBLE END; 14" bed; B.D. WALBURN-SWENSON; 12" stroke; Motor Dr. NO. 4 LONG & ALSTATTER; 10" stroke

GRINDERS

DISC: No. 24 GGRINDERS
No. 6 Gorion Double End 18" disc, B.D.
No. 6 Gorion Double End 18" disc, B.D.
No. 16 Besly, 30" discs
SURFACE: No. 3 Brown 6 Sharpe Planer Type
No. 3 WILMARTH 6 MORMAN, Table 8x24"
KNIFE: 84" PLYMOUTH 6 61" SEYBOLD
No. 3 BRYANT Chucking Grinder, M.D.
No. 10 BRYANT Chucking Grinder, M.D.

GEAR MACHINERY NO. 365 GOULD & EBERHARDT

NO. 6-A CINCINNATI, 72"x20" NO. 6 FELLOWS Gear Shaper

HAMMERS

Standard Automatic Drop 3-No. 2-200 lb. 1-No. 4-400 lb. 1-No. 1-100 lb. 1-No. 1/2-50 lb.

Board Drop 800 lb. & 1000 lb. WILLIAMS & WHITE & BLISS

FLOOR LATHES

30 FT. PIT LATHE; FACE PLATE DIA. 156"; QUADRUPLE GEARED; INTERNAL FACE PLATE DRIVE

26/46"x20' SCHUMACHER & BOYE; DOUBLE SPINDLE; Back Geared 52"x22 FT. FIFIELD, Triple back geared 36"x14' SPRINGFIELD

36"x16 FT. SCHUMACHER & BOYE; DBG. 30"x16 FT. FIFIELD LCG., Back geared 30"x18 FT. LODGE & SHIPLEY; Back geared

30"x18 FT. LODGE & SHIPLEY; Back geared 21"x10" RYERSON-PHOENIX 14"x12" CARROLL JAMIESON 14"x6" BRADFORD & SOUTH BEND 24"x15 FT. NEW HAVEN, LCG., Back geared 24"/44"x18 FT. McCABE DOUBLE SPINDLE TURRET: 28" POND

INTERSTATE

HAS IT''

PRESSES TOGGLE

NO. 408B BLISS DOUBLE CRANK TOGGLE DRAWING—84" bet. housings; Twin drive; 25" plunger stroke; 60" die space; 8" shaft

NO. 268¹/₄ TOLÉDO TOGGLE DRAW-ING 84" between uprights; Plunger stroke 29"; Blankholder slide stroke 18"; Air cushions

PRESSES OBI

No. 6 CONSOLIDATED, B.G., 4" Strk.; 13" die space, with tie rods Nos. 5 & 5½ CONSOLIDATED, B.G. No. 4 CONSOLIDATED, 3" Stroke NOS. 5 & 5A TOLEDOS; 4" stroke; bed 18"×27"

NO. 4S ROBINSON; 4" stroke No. 5 BLISS CONSOLIDATED, 4" strk.

PRESSES—HORN
No. 24 BLISS CONSOLIDATED, 3" str.
No. 16 BLISS, 2" Str., No. 42 TOLEDO
No. C-A-4 FERRACUTE, 4" Stroke

PRESSES—MISCELLANEOUS
ARCH: No. 04 LEFFLER, 2" Stroke
No. 58 HOLDEN, 2½" Stroke; No. 406-A ADRIANCE, 5" Stroke, B.G.



OPEN BACK GAP FRAME: No. 7 PERKINS, 1½" Stroke No. 6 R 6 K Style N, 4" Stroke, B.G. No. 76 TOLEDO, 3½" Stroke; No. 68 WOLD EMBOSSING: 150 Ton FERRACUTE STRIP FEED: No. 31-C McDONALD

SEND FOR CATALOG NO. 404

SPINNING LATHES 24" BLISS, NO. 6 BLISS 30" swing No. 326 TOLEDO BB, 30" swing

MILLS

No. ½ VAN NORMAN DUPLEX; Motor drive No. 1 KNIGHT VERT.; No. 3 PRATT & WHIT NEY DIE SINKER; BILTON CAM MILLER

GANG PUNCHES

NO. 2 LONG & ALLSTATTER, 74" bet. hsqs. NO. 5 BERTSCH, 64" between housings BERTSCH—511/4" between housings; Motor Dr. 2—No. 10 WELLS, 1—34" between 1—73" bet.

SINGLE END PUNCHES

No. 2—HILLES & JONES Horis. Cap. 1" thru 1"; H & J Beam Punch

ROLLER DIE MACHINES 5, 6, 7 & 8 Spindle

ROLLER LEVELERS 50" HILLES & JONES—54" McKAY

RIVETERS

STAKE & PUNCH: Rock River, 36" thru., B.D. 2—No. 6 WHITING; %" rivet hot, %" rivet cold; Punch ½" hole in %" steel; 50" thro. PNEUMATIC: Hanna Deep Gap Jaw, 18" gap, 102" reach; 15" gap, 102" reach

FRICTION SAWS
No. 1, 2, 3, 4 RYERSON, Power Feed
ROTARY SHEARS

No. 34M MARSHALLTOWN Lennox Bevel 3/4" No. 10 QUICKWORK; 80" throat 14 ga. cap. No. 3 QUICKWORK; 38" throat 3/18" cap.

PIPE THREADERS

12" LANDIS, Cap. 4".12"; 8 spindle speeds;
Landis Head; Motor Drive
12" STANDARD-WIELAND, Cap. 4"-12"
6" SAUNDERS, Landis Die Head

UPSETTER
3½" AJAX, Single geared; Steel Bed; 16"
stroke; Weight approximately 48,000 lbs.

JUST PURCHASED!

PLANERS

96"x12" GRAY; 30"x8"

RADIAL DRILLS
3" FOSDICK; 6" AMERICAN 6 FOSDICK
SHAPERS

20" & 24" GOULD & EBERHARDT 10" Vertical Slotter

MILL.

No. 3 BROWN & SHARPE Universal

Machinery Co., Inc.

49 W. PERSHING RD., CHICAGO, ILL.

REBUILT MACHINE TOOLS — — and we DO mean R-E-B-U-I-L-T

TURRET LATHES 3-3x36" Jones & Lamson Flat Turret Lathes, all geared head, single pulley drive, arranged for chucking work; with cross sliding head

2x24" Jones & Lamson Flat Turret Lathe, all geared head, single pulley drive, arranged for

bar work; with cross sliding head 1-24" swing Gisholt Turret Lathe; 3-step cone pulley drive; back geared; power feeds to hexaagon tilted turret and to cross slide; hole through spindle 25"

AUTOMATICS

model A Cleveland Full Automatic Screw Machine; belt drive; with 5-station turnet head 1-2" 1-23" model A Cleveland Full Automatic Screw Machine; belt drive; with 5-station turret head 1—No. 22 Prentice (New Britain) Multiple Spindle Automatic Chucking Machine. With four spindles and five chucking positions. Maximum diameter work held in false Jaws 2½"; maximum feed 4-8"; maximum distance spindle nose to chuck body 7-9-718. GRINDERS

1-12"x18" Cincinnati Plain Cylindrical Grinder; arranged for three-motor-drive; with Masterdriven headstock for infinito spindle speeds

No. 14 Brown & Sharpe Plain Cylindrical Grinder; three-motor-drive with Master-driven headstock for Infinite spindle speeds; maximum swing 10°; maximum grinding length 30° 1—No. 14 Brown & Sharpe Plain Cylindrical Grinder; three-motor-drive with Master-driven head-

stock for infinite spindle speeds; maximum swing 16"; maximum grinding length 48"

MISCELLANEOUS

1-20"/44"x10' Putnam Gap Bed Lathe, cone drive, back mared

1—20"/44"x10" Putnam cap Bed Latrie, Cone drive, back geared
1—3128" Brown & Sharpe Gear Gutting Machine, cone drive
1—No. 3 Thiel Combined Filing & Sawing Machine
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9/32	12	9	3.50
19/64	12	9	3.50
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21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
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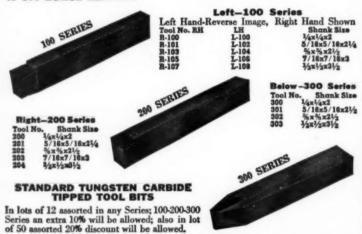
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PIPE MACH.—Williams 6" cap.; Oster 6"

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4' Dreses Plain

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1 spindle Sensitive

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No. 13 P. & W. Multi

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2 Churchill Internal, rind 30" deep, dist. of c No. can grind 30 nd 30" deep, dist. of center spindle to top of table 18". M.D.

20"x96" Landis Cyl. M. D. 24"x 96" Landis Cyl. M. D. 30" x 240" Landis Roll M. D. 24" Blount Snagging

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60"x60"x30' Gray, 4 hds., reversing motor drive with motor 26"x26"x8' Gray 24"x24"x8' Chandler, 1 hd.

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72" Cleveland G. Punch 60" Cleveland EF Punch

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24" Betts Heavy Duty

19" Putnam Heavy

18" Newton Heavy, M.D. 10" Betts, Cone or M.D.

TURRET LATHES

24" Ryerson Conradson Heavy Duty

MISCELLANEOUS

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Bolt Threader, 2" Landis

Bolt Threader, 14" Landis Compressor, 179 cn. ft. M.D.

Furnace, Brass, 500 lb.

Furnace, Westinghouse Elec. Gear Gen., 11" Gleason Bevel

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Gear Cutter, 96" Eberhardt Spur 96"x16" Gould &

Hammer, 70 lb. Scranton, Power

Header, 14" Acme Rivet

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Keystr., No. 6 Catlin, 40" stroke up to 5" wide

Keystr., No. 1 Davis, 1" capty. Keystr., No. 3 Baker, 26" stroke x 3" Keyways

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Lapper, Norton Type 1C

Magnetic Chuck, 24"x18" Walker on right angle plate

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Press, 1000 ton Watson Stillman Horiz, Hyd. Forcing

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Rotary Tables, 26" and 36" Saw, 10" Espen Lucas Cold

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Lapper, No. 1 vertical

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Grinder, Osterlein horizontal Erie 800 lb. & 1000 lb. Steam Hams. Univ. semi-auto. spline Grinders (2) Lodge & S. 30"x16' g.h. Q.C. Lathe Norton 18"x55" Plain Cyl. Grinder Miller, Becker No. 25 Plain Miller, Ohio 48" production No. 11/2-B K & T Vert. Milling Mch.

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18" of New Haven Slotter; 32

Slotter, belt drive

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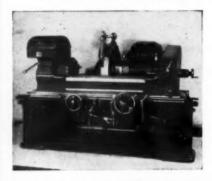
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36"x18' Putnam Lathe Grd. Hd., M.D.
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Hopper Feed

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GRINDER

19"x80" Werner Plain Cylindrical; Motor Dr.

MISCELLANEOUS

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MILLER Rotary, No. 3 Davis & Thompson
PIPE MACHINES, 10" Saunders; 2" Jarceki
PLANER, 24"×24"×3" Chandler
RIVETER Hydraulte, 150-ton Chambersburg
6" stroke; depth of gap 150"
AHEAR, 9" 2" Ferriess
AHEAR, No. 2 Lenox area; ?" canacity
SHEAR, M. 2. Throatless Geared Slitting

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10x24 Walker Univ. Cyl. M D. Pwr. Fds., 3 motors LATHES Q.C.G. 14x6 American T.A. 14x6 Hendey T. A. Yoke 15"x6' Rocklord 15"x6' Carrol Jamieson, 48x25 Putnam, M.D. 16x8 Whitcomb & Blaisdell 18x10 Barnes M.D.

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No. 1 Chgo. With Vert. att.
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No. 1 Cin. B.G., P.F. plain
Hendey, Prod. type 36"x15"
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DRILL, 22" Prentice Silding hd., belt driven
DRILL, 22" Prentice Silding hd., belt driven
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LATHE, 22"x10' LeBlond, prod. type, belt LATHE, 20"x10' Monarch, grd. hd., mtr. dr. LATHE, 16"x12' National, belt drive, q.c. LATHE, 26".50"x18' McCabe 2 spindle, belt LATHE, 26".50"x18' McCabe 2 spindle, belt LATHE, 22"x10' LeBlond production type MILLER, No. 8 Becker Duplex, table 40x11 MILLER, No. 2 Becker Vertical, belt, table 18"x9" with 13" rotary table PIPE MACHINE, 4".2" Landis, belt drive 11 Name 2 and 3 and 2 and 2 and 3 and

18"x9" with 13" rotary table
PIPE MACHINE, 1"2" Landis, belt drive
PLANER, 36"x36"x8" American
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16x8 Flather M.D.
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Robinson Tog. Press 125 Tons
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WELDERS
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60 cycle
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60 cycle
25 K.V.A. Thompson 25 cycle
25 K.V.A. Thompson 25 cycle
20 K.W. Toledo 40 cycle
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25 cycle K.W. Federal Butt Welder

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Snear
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3A High Speed Hammer
Morton Keyseater 4" cap.
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Cut-off %"x18' Nilson Wire Straightener and Cutoff

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Fay & Egan S. end Tenoner
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- No. 6 Besly Opp. Disc Grinder
- No. 26 Besly Opp. Disc Grinder
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- 12"x36" Cincinnati Univ. Grinder
- 12"x48" Cincinnati Plain Grinder
- 10"x36" Norton Grinder
- No. 14 Brown and Sharpe Grinder
- No. 19 Brown & Sharpe Automatic
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 Bliss No. 22 Horn, Swing Table, M.D.
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31/2" Bar HORIZON, BORING MILL.

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No. 23 Baster D. Whit. Int.
No. 3 Baster D. Whit. Int.
No. 3 Baster D. Whit. Int.
No. 3 Beserver Language State State
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No. 2 Becker Vert.
SHAPERS
14" Smith Mills Crank
MISCELLANEOUS
Auto. Serew Machine, No. 53
Acte, 1 Cap. M.D. 4 Spdl.
Acte. 1 Cap. M.D. 4 Spdl.
Broach, No. V-18 American
Comp. 8x8" C.P.T. Hor. Air
Die Filer, No. 5 Thiel, m.d.
Planer, 30x30x12" American

Bristol Rotary Surf., 11 ½" Dia. Planer, 36x36x12' W & P. 2 Mag. Ck.

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Plate rolls, 10' Long, 6" dia.
rolls
Press, No. 1 Bliss Cam, Fly
Presses, No. 50 Wat, Far, OBI
Flywhed!
Punch, No. 3 L & A Geared 6"
Throat
Press, No. 3 Bliss Stiles, Grd.
Hurs, No. 1 Bb. 3A

Hrs. Nos. 11B, 3A H.D., 4A Mtr. Dr. & 5A High Speed aw, 6x6" Eacine High Speed

High Saw, 6x6" Bacine High Special Hack Scleroscopes, Mod. "D" Shore Tester, Brinnel Hardness Welder, 20 KW Ace Spot

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4 spdl. Sigourney

4 spdl. Henry & Wright

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3½' Cincinnati Bickford 5' Western

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MOTOR DRIVEN

12¹ x 36² 12² x 50² 12² x 72²

(See page 340—special advertisement)
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No. 40 Bryant Wide Wheel, Oscilating

No. 5 Springfield Planer Surface

No. 18 Bryant Internal

No. 60 Heald Cylinder

No. 10 Lees-Bradner Spur Gear Grinder

MFG. LATHES

3½"x60" Fitchburg Lo Swing
No. 4AC LeBlond Auto, Crankshaft

ENGINE LATHES

26"x10' Bridgeford Plain Turning 30"x12' Whitcomb-Blaisdell

SHAPERS AND PLANERS

20" Gould & Eberhardt 24"x24"x12' Gray 36"x36"x8' Cincinnati

SHEAR

No. 421/2 Pels Beam Shear

MISCELLANEOUS

No. 3-B J. N. La Pointe Broach

No. 4 J. N. La Pointe Broach

6" Saunders Pipe Machine

12" Bignall & Keeler Pipe Mach.

60" Quickwork Rotary Shear

No. 4 Gaterman Pneumatic Tapper

HILL-CLARKE MACHINERY CO.

645 W. WASHINGTON BOULEVARD, CHICAGO

Index To Advertisers

Asser Weeklesser C.	Chicago Die Casting Mfg. Company Chicago Pneumatic Tool Company Chicago Wheel & Mfg. Co. Cincinnati Electrical Tool Co.	50
Aaron Machinery Co. 307 Abart Gear and Machine Co. 200	Chicago Pneumatic Tool Company	9
Abart Gear and Machine Co. 200 Acheson Colloids Corp. 195	Chicago wheel & Mig. Co.	178-179
Aeme Diemond Tool Co.	Cincinnati Electrical 1001 Co.	350
Acme Equipment Company 350	Cincinnati Machinery & Sanata Co	33
Acme Diamond Tool Co. 106 Acme Equipment Company 350 Acme Industrial Co. 206	Cincinnati Grinders, Inc. Cincinnati Machinery & Supply Co. Cincinnati Milling Machine Co.	33
Acme Tool Co. 83,200	Cincinnati Shaper Co. Cincinnati Tool Co.	6
Acromark Corp. 154	Cincinnati Tool Co.	293
Aget-Detroit Mfg. Co. 248	Circular Tool Co.	285
Acromark Corp. 154 Aget-Detroit Mfg. Co. 248 Aircraft Mehy. Corp. 229	Circular Tool Co. Clark Instrument, Inc. Cleveland Tool Eng. Co. Cleveland Twist Brill Co.	73
Alco Tool Company 167	Cleveland Tool Eng. Co.	75
Alco Tool Company 167 American Air Filter Co. 175 American Broach & Machine Co. 98	Cleveland Twist Drill Co.	49
American Broach & Machine Co. 98	Climax Molybdenum Co.	183
American Gauge Co. 201 American Metal Works 136	Climax Molybdenum Co. Climax Molybdenum Co. Colwell, Co., S. G. Cone Automatic Machine Co. Continental Machines, Inc.	202
American Saw & Míg. Co. 283	Continental Machine Co.	30
American Tool Salvage Co. 314	Continental Machines, Inc. Conway Clutch Co. Covel Manufacturing Co. Criterion Machine Works	10-1
Ames Co., B. C. 266	Covel Manufacturing Co.	95
Ames Co., B. C. 266 Anderson Bros. Mfg. Co. 265 Anderson & Brown Co. 139	Criterion Machine Works	294
Anderson & Brown Co. 139	Criterion Machine Works Cullen-Friestedt Co. Cullman Huber Sales Co. Cullman Wheel Co.	259
Annis, R. B. 249	Cullman Huber Sales Co.	246
Annis, R. B. 249 Armstrong - Blum Mfg. Co. Inside Front Cover	Culiman Wheel Co	Back Cover
	Cushman Chuck Co.	112
Armstrong Bros. Tool Co.	D D	
Armstrong Bros. Tool Co. 4 Armstrong Bros. Tool Co. 4 Aro Equipment Corp. 128 Atlantic Mehy. Exchange 350	Dallas Meh. & Eng. Works	311
Atlantic Saw Mfr. Co. 210	Daniels, C. R. Danly Machine Specialties	301
Atlantic Saw Mfg. Co. 219	Darnell Corn Ltd.	994
Atlas Equipment Co. 234 Auto Moulding & Mfg. Co. 74	Darnell Corp., Ltd. Davis Boring Tool Div. Davis Meby. Co. Dayton Rogers Mfg. Co.	933
Auto Ordnance Corp. 254	Davis Mchy, Co.	310
Auto Ordnance Corp. 254 Avey Drilling Machine Co. 16	Dayton Rogers Mfg. Co.	221
R	Dearborn, J. W.	279
Nakawali Mfr. Co. 197	Dearborn Gage Company	56
Baldor Electric Co. 190	Delta Manufacturing Co.	121
Bansbach Machinery Corp. 313-314	Dearborn J. W. Dearborn Gage Company Delta Manufacturing Co. Desmond.Stephan Mfg. Co. Detroit Broach Co.	277
Barron Machinery Co. 330-338	Detroit Broach Co. Detroit Power Screwdriver Co.	941
Baidor Electric Co. 190 Bansbach Machinery Corp. 313-314 Barron Machinery Co. 330-338 Baumbach Mfg. Co., E. A. 251 Bay State Abrasive Products Co. 118 Bay Estate Abrasive Products Co. 234	Detroit Stamping Co.	979
Bay State Abrasive Products Co. 118	Detroit Stamping Co. Detroit Tap & Tool Co.	101
Behr & Sons Co., Jos. 314	Detterbeck Co., Geo. L.	215
Serbeles Feminment Co. 333	Dewitt 1001 Company	3-44
Behr & Sons Co., Jos. 314 Ber & Sons Co., Jos. 335 Berskeley Equipment Co. 35 Bernstein & Co., Geo. M. 351 Beverly Shear Co. 235 Beverly Shear Co. 235	Diamond Tool Co.	262
Beverly Shear Co. 235		
	Distic Mig. Co.	160
Blake Co., Edward 12	Donkers & Desite	110
Blake Co., Edward 12 Blaner Co., John 251 Blank & Buxton Machinery Co. 32	Distic Mfg. Co. DoAll Company, Inc. Donberg & Danits Dony Machinery Co., D. E. Douglas Machinery Co.	911
Blank & Buxton Machinery Co. 32	Douglas Machinery Co.	205-215
Bliss Co., E. W. 71 Bokum Tool Co. 296 Bokum Tool Co. 330	Dreis & Krump Mig. Co. Drive-All Mig. Co. Durant Mig. Co. Duro Mig. Co. Duro Mig. Co. Duro Metal Products Co. Drive Co.	65
Bokum Tool Co. 296	Drive-All Mfg. Co.	180
Botwinik Brothers 330 Brady-Penrod, Inc. 210 Bremil Mig. Co. 292 Breuer Electric Company 164	Durant Mfg. Co.	134
Bremil Mfg. Co. 292	Duro Mfg. Co.	203
Breuer Electric Company 164	Duro Metal Products Co.	259
Brewster-Squires Company 287 Bridgeport Safety Emery Wheel Co. 250 Brooks Co., B. D. 313 Brown Engineering Co. 223-258		
Bridgeport Safety Emery Wheel Co. 250	Eastern Engineering Co. Eastern Machinery Co. East Shore Machine Products Co.	076
Brooks Co., B. D. 313	Fastern Machinery Co.	320.22
Brown Engineering Co. 223-258	East Shore Machine Products Co.	236
Brown Machinery Co. 322		
Brown & Sharpe Mig. Co. 207	Eisler Engineering Co., Inc.	133
Brown Machinery Co. 322 Brown & Sharpe Mfg. Co. 207 Bryant Chucking Grinder Co. 69 Buffalo Forge Co. 111	Elgin Tool Works	153
Rurgess Rattery Company 228	Elmes Engrg. Works, Chas. F.	31
Buffalo Forge Co. 111 Burgees Battery Company 228 Burke Machine Tool Co. 74 Burns Mcky, Co., F. W. 336 Burns A Ca. L. T. 200	Eisler Engineering Co., Inc. Elgin Tool Works Elmes Engrg. Works, Chas. F. Elyria Belting & Machinery Co.	312
Burns Mchy, Co., F. W. 336	Emerment of Co. Pours E.	
Burr & Son, J. T. 298	Empire Tool Co. Enterprise Machine Parts Corp.	191
Burr & Son, J. T. 298 Busch Co., J. C. 209		
	Errington Mechanical Laboratory	150
C. W. C. Corp. 212	Esco Engineering Corp. Essley Machinery Co., E. L. Ettec Tool Co. Eutectic Welding Alloys, Inc.	334
Canedy-Otto Mfg. Co. 149	Etteo Tool Co.	27
C. W. C. Corp. 212 Canedy-Otto Mig. Co. 149 Capewell Mig. Co. 172 Capitol Machinery Exchange 313 Capitol Machinery Exchange 217	Entectic Welding Alloys, Inc.	28!
Capitol Machinery Exchange 313	Ex-Cell-O Corp.	91
Carbide Fabricators 217	Excelsior Tool & Machine Co.	64
Carbide Fabricators 217 Catakill Metal Works 236-237	Ex-Cell-O Corp. Excelsior Tool & Machine Co. Experimental Tool & Die Company	293

F. & M. Sales Company	26
Factory & Mill Supply Co., Inc.	31:
Failor-Strafer Machinery Co.	31
Falk Mill Supply Co.	33
Fameo Machine Co.	21
Federal Foundry Supply Co.	28
Fainco Machine Co. Federal Foundry Supply Co. Federal Press Co. Federal Press Co.	24
	18
Fell Co., Wm. B.	283
Fellows Gear Shaper Co.	9
Field Abrasive Specialty Mfg. Co. Fitchburg Grinding Meh. Co.	6
Fitchburg Grinding Mch. Co.	150
Forse Corp.	16
Forse Corp. Foster Machinery Co. Fray Machine Tool Co. Fruifto Specialties Co.	31:
Fray Machine Tool Co.	29
Fray Machine Tool Co. Fuiflo Specialties Co.	14
G	
Galbreath Mchy. Co. Gallmeyer & Livingston Co.	32:
Gallmeyer & Livingston Co.	
Gaston Power 10018 Co.	34
	159
General Meh. Tool Co.	70
General Machinery Corp. George Mchy. Co., James W. 231	-315
Gilmore & Co., F. F.	21
Gilmore Mehy. Co.	348
Gits Brothers Mfg. Co.	24
Given Machinery Co.	189
	306
Goldman & Co., Harvey Gorion Machine Co., Geo Graham Machine Tool Co. Graham Mig. Company Grant Mig. & Machine Co.	323
Gorton Machine Co., Geo.	91
Graham Machine Tool Co.	339
Graham Mfg. Company	164
Grant Mfg. & Machine Co.	218
	53
Greenerd Arbor Press Co. Grenby Manufacturing Co.	297
Grenby Manufacturing Co.	269
Grob Brothers	286
Grobet File Co. of Am. 252	253
Grobet File Co. of Am. 252	
Grobet File Co. of Am. 252	165
Grobet File Co. of Am. 252	165
Grobet File Co. of Am. 252	165 309 242
Grobet File Co. of Am. 252	165 309 242 282
Grobet File Co. of Am. 252 Haleo Products Co. Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hamilton Tool Co., The 161 Hamilton J. L. Hamilton Mig. Co.	165 309 242 282 61
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Mch. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hansen Manufacturing Co.	163 309 242 282 61 123
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Mch. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hansen Manufacturing Co.	165 309 242 282 61 123
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hardinge Brothers, Inc. Harrford Special Machinery Co.	165 309 242 282 61 123
Grobet File Co. of Am. 252 Haleo Products Co. Hamilton Mch. Shop, Chas. T. Hamilton Tool Co., The 161 Haniften, J. L. Hanniftan Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hartford Special Machinery Co. Harvey Mfg. Coru.	165 309 242 282 61 123
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop., Chas. T. H Hamilton Tool Co., The 161 Hannifan Mig. Co. H Hannifan Mig. Co. H Hardinge Brothers, Inc. H Hartford Special Machinery Co. H Harco Machinery Co. H Harco Machinery Co.	163 309 242 282 61 123 211 257 317
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meb. Shop, Chas. T. Hamilton Tool Co., The 161 Hannifen Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hartford Special Machinery Co. Harvey Mfg. Corp. Haseo Machinery Co. Haskins Company, R. G.	163 309 242 282 61 123 211 257 317
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Mch. Shop., Chas. T. Hamilton Mch. Shop., Chas. T. Hamilton Tool Co., The 161 Hamilton J. L. Hamilton Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Mg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co.	163 309 242 282 61 123 211 257 317 21 72
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Mch. Shop., Chas. T. Hamilton Mch. Shop., Chas. T. Hamilton Tool Co., The 161 Hamilton J. L. Hamilton Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Mg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co.	163 309 242 282 61 123 211 257 317 21 72
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Mch. Shop., Chas. T. Hamilton Mch. Shop., Chas. T. Hamilton Tool Co., The 161 Hamilton J. L. Hamilton Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Mg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co.	163 309 242 282 61 123 211 257 317 21 72
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hardinge Brothers, Inc. Harsen Manufacturing Co. Harriford Special Machinery Co. Harving Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heuser Manufacturing Co. Helleo Corp. Hilleo Corp.	163 309 242 282 61 123 211 257 317 21 72 206 199 352
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. 161 Hamilton Tool Co., The 161 Hanifen, J. L. 161 Hannifan Mfg. Co. Hansen Manufacturing Co. Harsen Manufacturing Co. Harden Grothers, Inc. 161 Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heuser Manufacturing Co. Hileo Corp. Hillo Carp. 161 Hill-Clarke Machinery Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hotel Metanole	165 309 242 282 61 123 211 257 317 21 72 206 199 352
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. 161 Hamilton Tool Co., The 161 Hanifen, J. L. 161 Hannifan Mfg. Co. Hansen Manufacturing Co. Harsen Manufacturing Co. Harden Grothers, Inc. 161 Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heuser Manufacturing Co. Hileo Corp. Hillo Carp. 161 Hill-Clarke Machinery Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hobart Brothers Co. 340 Hotel Metanole	165 309 -242 282 61 123 211 257 217 220 199 -352 1302 284
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Harriord Special Machinery Co. Harryed Mfg. Corp. Haseo Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heluser Manufacturing Co. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc.	165 309 -242 282 61 123 211 257 217 2206 199 -352 1302 284 176
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hamilton Tool Co., The 161 Hamilton Mig. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Hardinge Brothers, Inc. Hardinge Special Machinery Co. Hasco Machinery Co. Hasco Machinery Co. Haskins Company, R. G. Heimann Mig. Co. Heuser Manufacturing Co. Hille Corp. Hille Corp. Hille Clarke Machinery Co. 340 Hobart Brothers Co. 340	165 309 -242 282 61 123 211 257 217 220 199 -352 1302 284
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Harreford Special Machinery Co. Harreford Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heluser Manufacturing Co. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph	165 309 242 282 61 123 3 211 257 317 21 200 199 352 284 170 311
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meb. Shop, Chas. T. Hamilton Meb. Shop, Chas. T. Hamilton Tool Co. The 161 Hannien, J. L. Hannifan Mfg. Co. Hardinge Brothers, Inc. Harstford Special Machinery Co. Hartford Special Machinery Co. Hartford Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heluser Manufacturing Co. Hilto Corp. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hymna & Sons, Joseph	165 309 242 282 61 123 211 257 217 22 200 199 352 284 170 311
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meb. Shop, Chas. T. Hamilton Meb. Shop, Chas. T. Hamilton Tool Co. The 161 Hannien, J. L. Hannifan Mfg. Co. Hardinge Brothers, Inc. Harstford Special Machinery Co. Hartford Special Machinery Co. Hartford Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heluser Manufacturing Co. Hilto Corp. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hymna & Sons, Joseph	165 309 242 282 61 123 211 257 217 22 200 199 352 284 170 311
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meb. Shop, Chas. T. Hamilton Meb. Shop, Chas. T. Hamilton Tool Co. The 161 Hannien, J. L. Hannifan Mfg. Co. Hardinge Brothers, Inc. Harstford Special Machinery Co. Hartford Special Machinery Co. Hartford Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heluser Manufacturing Co. Hilto Corp. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hymna & Sons, Joseph	165 309 242 282 61 123 211 257 217 22 200 199 352 284 170 311
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifan Mfg. Co. Hansen Manufacturing Co. Hardeinge Brothers, Inc. Hardinge Brothers, Inc. Harriord Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heuser Manufacturing Co. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Ideal Commutator Dresser Co. Illinois Testing Laboratorics, Inc. Illidianapolis Machinery & Supply Co. 329-	165 309 242 282 61 123 3 211 257 210 29 352 284 170 311 256 311 256 334 4193
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. 161 Hamilton Meh. Shop, Chas. T. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hardinge Brothers, Inc. 161 Hardinge Machinery Co. 161 Haskins Company, R. G. 161 Heuser Manufacturing Co. 161 Heuser Manufacturing Co. 161 Hill-Clarke Machinery Co. 340 Hobart Brothers Co. 161 Hobart Brothers Co. 161 Hotel Metropole 161 Hotel Metropole 161 Hotel Philadelphian 162 Homan & Sons, Joseph 161 Ideal Commutator Dresser Co. 111 Hotel Stetting Laboratories, Inc. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161	165 309 242 282 61 123 211 257 211 200 199 352 217 203 303 217 217 217 217 217 217 217 217 217 217
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. 161 Hamilton Meh. Shop, Chas. T. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hanifen, J. L. 161 Hardinge Brothers, Inc. 161 Hardinge Machinery Co. 161 Haskins Company, R. G. 161 Heuser Manufacturing Co. 161 Heuser Manufacturing Co. 161 Hill-Clarke Machinery Co. 340 Hobart Brothers Co. 161 Hobart Brothers Co. 161 Hotel Metropole 161 Hotel Metropole 161 Hotel Philadelphian 162 Homan & Sons, Joseph 161 Ideal Commutator Dresser Co. 111 Hotel Stetting Laboratories, Inc. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161 Handianapolis Machinery & Supply Co. 329 Industrial Diamond Co. 161	165 309 242 282 61 123 211 257 211 200 199 352 217 203 303 217 217 217 217 217 217 217 217 217 217
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifan Mfg. Co. Hansen Manufacturing Co. Hardeinge Brothers, Inc. Hardinge Brothers, Inc. Harriord Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Heuser Manufacturing Co. Hilto Corp. Hilt-Clarke Machinery Co. 340 Hobart Brothers Co. Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Ideal Commutator Dresser Co. Illinois Testing Laboratorics, Inc. Illidianapolis Machinery & Supply Co. 329-	165 309 242 282 61 123 211 257 211 200 199 352 217 203 303 217 217 217 217 217 217 217 217 217 217
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meb. Shop, Chas. T. Hamilton Meb. Shop, Chas. T. Hamilton Tool Co. The 161 Hannien, J. L. Hannifan Mfg. Co. Harden Grobers, Inc. Harsen Manufacturing Co. Harden Grobers, Inc. Harstford Special Machinery Co. Harvey Mfg. Corp. Hasco Machinery Co. Hasco Machinery Co. Hasco Machinery Co. Heleuser Manufacturing Co. Hilto Corp. Hilto Corp. Hilto Corp. Hilto Carb. Hobart Brothers Co. Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Heal Commutator Dresser Co. Hillinois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Industrial Diamond Co. Industrial Diamond Co. Inland Machinery Co. Interestate Machinery Co.	165 309 242 242 61 123 211 257 317 2199 352 170 311 256 344 193 176 346 3325
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mig. Co. Hardinge Brothers, Inc. Harsen Manufacturing Co. Hardringe Brothers, Inc. Hartford Special Machinery Co. Harking Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mig. Co. Heisser Manufacturing Co. Hilleo Corp. Hill-Clarke Machinery Co. Hotel Metropole Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Ideal Commutator Dresser Co. Illinois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Jadustrial Diamond Co. Industrial Products Suppliers Inland Machinery Co. Jackson Machine & Tool Co.	165 309 242 282 61 125 317 21 256 352 284 170 311 256 252 344 193 176 346 332 334 44 193 253 253 253 253 253 253 253 253 253 25
Grobet File Co. of Am. 252 Halico Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hanifen, J. L. Hannifa Mig. Co. Hardinge Brothers, Inc. Harsen Manufacturing Co. Hardringe Brothers, Inc. Hartford Special Machinery Co. Harking Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mig. Co. Heisser Manufacturing Co. Hilleo Corp. Hill-Clarke Machinery Co. Hotel Metropole Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Ideal Commutator Dresser Co. Illinois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Jadustrial Diamond Co. Industrial Products Suppliers Inland Machinery Co. Jackson Machine & Tool Co.	165 242 282 61 123 211 257 217 210 2199 352 284 170 311 256 252 344 193 346 346 346 346 346 346 346 346 346 34
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hannifen Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Harvey Mfg. Corp. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Helimann Mfg. Co. Helimann Mfg. Co. Hileo Corp. Hill-Clarke Machinery Co. 340 Hobart Brothers Co. Holost Brothers Co. Hole Manufacturing Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Holost Brothers Co. Holost Brothers Co. Holost Brothers Co. Holimois Toesser Co. Hilmois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Interstate Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Co., Chas. L. Jefferson Machine & Tool Co. Jatevico Mach. Tool Co.	165 309 242 282 61 125 317 21 72 200 319 302 284 4170 311 256 325 344 193 346 325 346 317 363 317 363 317 317 317 317 317 317 317 317 317 31
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hannifen Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Harvey Mfg. Corp. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Helimann Mfg. Co. Helimann Mfg. Co. Hileo Corp. Hill-Clarke Machinery Co. 340 Hobart Brothers Co. Holost Brothers Co. Hole Manufacturing Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Holost Brothers Co. Holost Brothers Co. Holost Brothers Co. Holimois Toesser Co. Hilmois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Interstate Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Co., Chas. L. Jefferson Machine & Tool Co. Jatevico Mach. Tool Co.	165 309 242 282 61 125 32 21 72 200 352 200 352 17 302 41 17 302 41 17 303 41 17 303 41 17 303 41 17 303 41 17 303 41 17 41 41 41 41 41 41 41 41 41 41 41 41 41
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161 Hannifen Mfg. Co. Hansen Manufacturing Co. Hardinge Brothers, Inc. Harvey Mfg. Corp. Harvey Mfg. Corp. Hasco Machinery Co. Haskins Company, R. G. Heimann Mfg. Co. Helimann Mfg. Co. Helimann Mfg. Co. Hileo Corp. Hill-Clarke Machinery Co. 340 Hobart Brothers Co. Holost Brothers Co. Hole Manufacturing Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Hill-Clarke Machinery Co. Holost Brothers Co. Holost Brothers Co. Holost Brothers Co. Holimois Toesser Co. Hilmois Testing Laboratories, Inc. Indianapolis Machinery & Supply Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Industrial Diamond Co. Interstate Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Machinery Co. Jatevico Co., Chas. L. Jefferson Machine & Tool Co. Jatevico Mach. Tool Co.	165 309 242 282 61 125 317 21 200 317 200 317 203 317 203 317 203 317 317 217 317 217 217 217 217 217 217 217 217 217 2
Grobet File Co. of Am. 252 Haleo Products Co. H Hamilton Meh. Shop, Chas. T. Hamilton Tool Co., The 161. Hannifan Mfg. Co. Hannen Manufacturing Co. Harden Manufacturing Co. Harden Brothers, Inc. Hardinge Brothers, Inc. Harden Grothers, Inc. Harden Machinery Co. Hasco Machinery Co. Haken Machinery Co. Hileo Corp. Hill-Clarke Machinery Co. Hilleo Corp. Hill-Clarke Machinery Co. Hobart Brothers Co. Hobart Brothers Co. Hobart Brothers Co. Hotel Metropole Hotel Philadelphian Howe & Son, Inc. Hyman & Sons, Joseph Ideal Commutator Dresser Co. Illinois Testing Laboratories, Inc. Industrial Products Suppliers Industrial Products Suppliers Inland Machinery Co. Jarvis Co., Chas. I. Jefferson Machine & Tool Co. Jarvis Co., Chas. I. Jefferson Mach. Tool Co.	165 309 242 282 61 123 211 722 200 199 352 284 170 311 256 252 284 193 343 176 33 25 133 140

Jones Machine Tool Co. Junkin Safety Appliance Co.	312
Junkin Safety Appliance Co.	
w	-00
Junkin Safety Appliance Co. Kalamazoo T. & S. Co. Kamis Eng. Co. Karelsen, Inc., E. Kearney & Trecker Corp. Kempsmith Machine Co.	
Kalamazoo T. & S. Co.	166
Kamis Eng. Co.	351
Karelsen, Inc., E.	287
Kearney & Trecker Corp.	51
Kempsmith Machine Co.	77
Klauber Machinery Co., E. L.	312
Kempemith Machine Co Klauber Machinery Co., E. L Knight Machinery Co., W. B.	59
Knu-Vise, Inc.	267
L. & J. Press Corp.	280
L-W Chuck Co.	177
Lafavetta Machinery Corn	247
Lafavette Tool & Supply Co. 349	249
Lake Machinery Co.	334
Lang Machinery Co.	309
Laurena Bros	309
L. & J. Press Corp. L.W Chuck Co. Lafayette Machinery Corp. Lafayette Tool & Supply Co. 342 Lake Machinery Co. Laurens Bros. LeBlond Mch. Tool Co., R. K. Front C. Lee Co., K. O.	320
Lee Co. K. O.	100
Lee Co., K. O. Lempeo Prod. Inc. Leslie Welding Co.	270
Leglia Wolding Co.	100
Lewis Machine Tool Co.	240
Liberty Tool & Case Works	100
Lima Flantala Mater Co	105
Lindson Machine & Tool Co.	125
Linderme Machine & Tool Co.	268
Lempeo Prod. Inc. Lesite Welding Co. Lewis Machine Tool Co. Liberty Tool & Gage Works Lina Electric Motor Co. Linderme Machine & Tool Co. Linderme Machine & Tool Co. Linderme Machine Co. Lipe Rollway Corp. Inside Back C Littell Machine Co., F. J. Logan Engineering Co. Lombard Governor Corp. Lombard Governor Corp. Lucas & Son, Inc., J. L. Luma Electric Equipment Co.	300
Lipe-Ronway Corp. Inside Back C	over
Latteri Machine Co., F. J.	170
Logan Engineering Co.	117
Lombard Governor Corp.	238
Lombard Manufacturing Co.	105
Lucas & Son, Inc., J. L.	341
Luma Electric Equipment Co.	232
M	
McCabe & Sheeran Mchy, Corp.	323
McDonald Machinery Co.	331
McKenna Metals Co.	34
M-M-H- C V	
MCMunen, G. R.	351
Machinery Mfg. Co. 145	351
Machinery Mfg. Co. 145. Madison-Kipp Corp.	351 286 271
Machinery Mfg. Co. 145- Madison-Kipp Corp. Mall Tool Company	351 -286 271 20
Machinery Mfg. Co. 145- Madison-Kipp Corp. Mall Tool Company Marshalltown Mfg. Co.	351 286 271 20 24
Machinery Mg. Co. 145 Machinery Mg. Co. 145 Madiloon-Kipp Corp. Mall Tool Company Marshalltown Mg. Co. Mellaphone Corp.	351 -286 271 20 24 314
Machinery Mig. Co. 145 Madison-Kipp Corp. Mall Tool Company Marshalltown Mig. Co. Mellaphone Corp. Mevers Company, W. F.	351 -286 271 20 24 314 107
Machinery Mig. Co. 145 Madhison-Kipp Corp. Mall Tool Company Marshalltown Mig. Co. Mellaphone Corp. Meyers Company, W. F. Michigan Chrome & Chemical Co.	351 286 271 20 24 314 107
Machinery Mig. Co. 145 Madison-Kipp Corp. Mall Tool Company Marshalltown Mig. Co. Mellaphone Corp. Meyers Company, W. F. Michigan Chrome & Chemical Co. Michigan Tool Co.	351 -286 271 20 24 314 107 290
MeCabe & Sheeran Mehy, Corp. McDonald Machinery Co. McKenna Metals Co. McKullen, G. K. Machinery Mfg. Co. Madison-Kipp Corp. Mall Tool Company Marshalltown Mfg. Co. Mellaphone Corp. Meyers Company, W. F. Michigan Tool Co. Michigan Tool Co. Micro Products Co.	351 -286 271 20 24 314 107 290 131
Machinery Mig. Co. 145 Madison-Kipp Corp. Mall Tool Company Marshalltown Mig. Co. Mellaphone Corp. Meyers Company, W. F. Michigan Chrome & Chemical Co. Michigan Tool Co. Micro Products Co. Midwest Tool & Eng. Co.	351 -286 271 20 24 314 107 290 131 262 284
Midwest Tool & Eng. Co.	262 284
Midwest Tool & Eng. Co.	262 284
Midwest Tool & Eng. Co.	262 284
Midwest Tool & Eng. Co.	262 284
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Machinery Co. Modern Collet & Machine Co. 33.	262 284 295 147 319 314
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Milburn Co. Millers Falls Co. Millers Falls Co. Miles Machinery Co. Modern Collet & Machine Co. 33- Modern Machine Corp.	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Millor Rells Co. Millers Machinery Co. Modern Collet & Machine Co. Modern Collet & Corp. Modern Motor Drives Modern Tools, Modern Tools, Modern Tools, Modern Tool Works Mohr Lino-Saw Co. Monarch Machiner Co. Monarch Machiner Tool Co. Monarch Machinery Co., Inc. 273-280-292. Morris Machinery Co., Moser Machinery Co., Moser Machiner Tool Sales Moslo Machinery, Inc. Moslo Machinery, Inc. Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools Mustwin Metal Bond Diamond Wheels & Tools	262 284 295 147 319 314 286
Micro Products Co. Midwest Tool & Eng. Co. Mildwest Tool & Eng. Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Monarch Machiner Co. Morey Machinery Co., Inc. 273-280-292 Mortis Machinery Co., Morton Aircraft Corp. Moser Machiner Col. Morton Aircraft Corp. Moser Machinery, Inc. Mustwin Metal Bond Dlamond Wheels & Tools N	262 284 295 147 319 314 286 239 264 23 206 4-55 343 204 316 220 250
Micro Products Co. Midwest Tool & Eng. Co. Mildwest Tool & Eng. Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Monarch Machiner Co. Morey Machinery Co., Inc. 273-280-292 Mortis Machinery Co., Morton Aircraft Corp. Moser Machiner Col. Morton Aircraft Corp. Moser Machinery, Inc. Mustwin Metal Bond Dlamond Wheels & Tools N	262 284 295 147 314 286 239 264 23 206 4-55 332 343 204 220 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morare Machiner Co. Morare Machinery Co., Inc. 273-280-292 Mortis Machinery Co., 314- Morton Aircraft Corp. Moser Machine Tool Sales Mosel Machine Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc.	262 284 295 147 319 314 286 239 264 23 206 4-55 332 343 204 320 250
Micro Products Co. Midwest Tool & Eng. Co. Mildwest Tool & Eng. Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morers Machiner Coo. Morers Machinery Co., Inc. 273-280-292 Morris Machinery Co., Inc. Mostom Alicraft Corp. Moseer Machiner Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc. Neiman Machiner Works Nesbitt Machinery, Inc. Nesbitt Machinery Co. New Britain Tool & Mfg Co. New Method Stel Stamps, Inc. Nicholson & Co., W. H. Nicholson & Co., W. H.	262 284 147 319 319 3286 4239 264 4.55 332 3316 2250 87 192 253 302 384 47
Micro Products Co. Midwest Tool & Eng. Co. Mildwest Tool & Eng. Co. Millers Falls Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Tool Works Modern Tool Works Modern Tool Works Mohr Lino-Saw Co. Morers Machiner Coo. Morers Machinery Co., Inc. 273-280-292 Morris Machinery Co., Inc. Mostom Alicraft Corp. Moseer Machiner Tool Sales Moslo Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc. Neiman Machiner Works Nesbitt Machinery, Inc. Nesbitt Machinery Co. New Britain Tool & Mfg Co. New Method Stel Stamps, Inc. Nicholson & Co., W. H. Nicholson & Co., W. H.	262 284 147 319 314 2286 239 264 4-55 332 2316 220 250 87 192 253 302 303 302 303 302 3002
Micro Products Co. Midwest Tool & Eng. Co. Millourn Co. Millers Falls Co. Millers Machiner Co. Modern Collet & Machine Co. Modern Collet & Machine Co. Modern Motor Drives Modern Tool Works Modern Tool Works Mohr Liso-Saw Co. Monarch Machiner Tool Co. Monarch Machiner Tool Co. Morey Machinery Co., Inc. 273-280-292 Morris Machinery Co., Inc. Moton Aircraft Corp. Mosto Machinery, Inc. Mustwin Metal Bond Diamond Wheels & Tools National Air Sanders, Inc. National Air Sanders, Inc. Neiman Machine Works Nesbitt Machinery Co. New Britain Tool & Mig Co. New Method Steel Stamps, Inc. Nicholson File Co. Niclesen, Inc.	262 284 147 319 314 3286 455 332 3316 2250 87 192 253 302 384 47

Nielsen Tool & Die Co. 271	Smith Power Transmission Co	190
Nielsen Tool & Die Co. 271 Nilson Machine Co., A. H. 244-245		79
North Machine Tool Co. 310	Sommer & Adams Co. South Bend Lathe Works South Hills Ornamental Iron Works Southwest Mr. Co.	49
Numberall Stamp & Tool Co. 222	South Hills Ornamental Iron Works 3	13
Nutmeg State Mehy. Corp. 310		49
Ō	Stackbin Corporation 2	19
O'Brien Machinery Co. 348	Stackbin Corporation 2	89
O'Brien Machinery Co. 348 Oliver Instrument Co. 227 Oliver Machinery Co. 279	Standard Machinery Co. 3	11
Oliver Motorcraft Corp. 279	Standard Pressed Steel Co. 1	57
Oliver Motorcraft Corp. 279 O'Neil-Irwin Manufacturing Co. 242 Observe & Section Machinery Co. 348	Standard Transmission Equip. Co.	52
Osborne & Sexton Machinery Co. 348	Steege Machinery Co., W. L. 155-3	12
Ott Machinery Sales, Inc. 338	Stone Co., Chas. W. 3	11
	Strong, Carlisle & Hammond Co. 3	40
Pacific Tool & Supply Co. 976	Strong, Carlisle & Hammond Co. 3 Sturdimatic Tool Co. Sturtevant Co., P. A. 2	38
Pacific Tool & Supply Co. 276 Passman Brothers 312-346	Sturtevant Co., P. A. 2 Sun Machinery Co. 3 Sun Oil Co.	70
Pellow Machine Co. 240	Sun Machinery Co. 3.	47
Pole Mohy H. H. 310-339	Sun Oil Co.	89
Pellow Machine Co. 240 Pelz Mehy., H. H. 310-339 Penn Tool & Machine Co. 260 Penn Tool & Machine Co. 196	Sun Oil Co. Sundstrand Machine Tool Co.	96
Plunket Machine Co., J. E. 196	Sunnen Products Co. 1	36
Portman Machine Tool Co. 270		13
Prait & Whitney 28 Precision Tool Co. 114 Procunier Safety Chuck Co. 22 Production Machine Co. 214 108 108	Sutton 1991 Co.	03
Precision Tool Co. 114	T. & H. Mfg. Co. 2 Tamms Silica Co. 2	
Progunier Safety Chuck Co. 22	T. & H. Mfg. Co. 2	80
Production Machine Co. 214	Tamms Silica Co. 2	62
	I address works	16
Products Engineering Co. 301 Progressive Tool & Cutter Co. 251	Tatra Tool Co. 2	30
Progressive Tool & Cutter Co. 251	Taylor Machine Co. 2:	24
Putnam Tool Co. 29	Threadwell Tap & Die Co. 1:	24
Putnam Tool Co. 29 Pyrometer Instrument Co. 260	Tool Engineering Service Co. 3	01
Q	Toomey Machinery Co., Frank	26
Quality Tool Works Q 224	Topeka Foundry & Iron Works	70
P	Triplex Machine Co. 3	38
R & I. Tools 36	Troyke, Alfred A.	52
Racine Tool & Mch. Co. 213		
Rapid Manufacturing Co. 298	U. S. Machine Tool Mfg. Corp. 3	03
Racine Tool & Mch. Co. 213 Rapid Manufacturing Co. 298 Reconstruction Machine Tool Co. 316	U. S. Tool Co.	97
Reeve-Fritts Co. 309	United Precision Products Co. 2	55
	Universal Engineering Co. 104-1	94
Reich Manufacturing Co., J. R. 76	Universal High Speed Tool Co. 2	52
Reich Manufacturing Co., J. R. 76 Reliance Machinery Sales Co. 307	U. S. Tool Co. 1 United Precision Products Co. 2 Universal Engineering Co. 104-1 Universal High Speed Tool Co. 2 Used and Rebuilt Machinery 307-3	52
Kemeo Products Corp. 220		
Rhode Island Tool Co. 263	Victor Machinery Co. 3 Victor Machinery Exchange 327-3 Vimeo Manufacturing Co. 2 Vine. R. 4	44
Richards Co., J. A. 76	Victor Machinery Exchange 327-3:	28
	Vimeo Manufacturing Co. 2	73
Rivett Lathe & Grinder, Inc.		
Rivett Lathe & Grinder, Inc. 2 Robbins & Myers, Inc. 163		
Rogers Machine Works 115		70
Rogers & Co., Saml. C. 265	Wade Tool Company W	70
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313	Wade Tool Company 2 Wagner Electric Corp. 18-	70
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18-	70
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18 Walker-Turner Co Wall-Columnoy Corp. 1 Walls Sales Corporation 0	70 19 26 62
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co Wall-Columony Corp. 1 Walls Sales Corporation 2 Wallbase Co. 2 Wallbase Co. 2 2 2 3 3 3 3 3 3 3	70 19 26 62
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Rose Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288	Wade Tool Company 2 Wagner Electric Corp. 18 Walker-Turner Co 11 Wall-Colmonoy Corp. 1 Walls Sales Corporation 2 Waltham Dial Gage Co. 2	70 19 26 62 30 73
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18 Walker-Turner Co 11 Wall-Colmonoy Corp. 1 Walls Sales Corporation 2 Waltham Dial Gage Co. 2	70 19 26 62 30 73
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co 11- Wall-Colmonoy Corp. 11 Walls Sales Corporation 2 Waltham Dial Gage Co. 2 Walton Co. 2 Walton Co. 2 Wardwell Mig. Co. 2 Weich Industries Inc. 70-	70 19 26 62 30 73 36 92
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co 11- Wall-Colmonoy Corp. 11 Walls Sales Corporation 2 Waltham Dial Gage Co. 2 Walton Co. 2 Walton Co. 2 Wardwell Mig. Co. 2 Weich Industries Inc. 70-	70 19 26 62 30 73 36 92
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Rose Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Rusnell Machine Co. 307 Ruthman Machinery Co. 72 Rycroon & Son, Inc., Jos. T. 44	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co 11- Wall-Colmonoy Corp. 11 Walls Sales Corporation 2 Waltham Dial Gage Co. 2 Walton Co. 2 Walton Co. 2 Wardwell Mig. Co. 2 Weich Industries Inc. 70-	70 19 26 62 30 73 36 92
Rogers Machine Works 115	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co 11- Wall-Colmonoy Corp. 11 Walls Sales Corporation 2 Waltham Dial Gage Co. 2 Walton Co. 2 Walton Co. 2 Wardwell Mig. Co. 2 Weich Industries Inc. 70-	70 19 26 62 30 73 36 92
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co Walk-Columnoy Corp. 1 Walker-Turner Co Walk-Columnoy Corp. 2 Wathham Dial Gage Co. 2 Wathon Co. 2 Wardwell Mig. Co. 2 Wardwell Mig. Co. 2 Week Industries Inc. 78- Weldex, Inc. 2 Wells Manufacturing Corp. 1 Westinghouse Elec. & Mig. Co. 2 Westlof Tool & Dic Co. 1 Westlof Tool & Dic Co. 1 Westlof Tool & Dic Co. 1	70 19 26 62 30 73 36 92 22 38 25
Rogers Machine Works	Wade Tool Company 2 Wagner Electric Corp. 18- Walker-Turner Co Walk-Columnoy Corp. 1 Walker-Turner Co Walk-Columnoy Corp. 2 Wathham Dial Gage Co. 2 Wathon Co. 2 Wardwell Mig. Co. 2 Wardwell Mig. Co. 2 Week Industries Inc. 78- Weldex, Inc. 2 Wells Manufacturing Corp. 1 Westinghouse Elec. & Mig. Co. 2 Westlof Tool & Dic Co. 1 Westlof Tool & Dic Co. 1 Westlof Tool & Dic Co. 1	70 19 26 62 30 73 36 92 22 38 25
Rogers Machine Works 115	Wade Tool Company 2 Wagner Electric Corp. 18 Walker-Turner Co Walk-Columnoy Corp. 1 Walker-Turner Co Wall-Columnoy Corp. 1 Walle Sales Corporation 2 Wattham Dial Gage Co. 2 Watton Co. 2 Watton Co. 2 Watton Co. 2 Wardwell Mig. Co. 2 Welch Industries Inc. 78 Weidex, Inc. 2 Welsh Manufacturing Corp. 1 Westinghouse Elec. & Mig. Co. 2 Westlof Tool & Die Co. 1 West Fenn Machinery Co. 3 3 West Fenn Machinery Co. 3 3 3 3 3 3 3 3 3	70 19 26 62 30 73 36 92 22 38 25 02 10 80
Rogers Machine Works 115	Wade Tool Company 2	70 19 26 62 30 73 92 28 25 20 80 32
Rogers Machine Works	Wade Tool Company 2	70 19 26 62 30 73 36 22 38 25 20 20 32 34
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 305 Savwage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company 2	70 19 26 62 30 73 36 92 23 80 80 32 54
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 305 Savwage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company 2	70 19 26 62 30 73 36 92 23 80 80 32 54
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 305 Savwage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 19 26 30 73 36 22 38 25 25 10 80 45 44 46
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 325 Savage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company 2	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 325 Savage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company 2	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 17 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savage Tool Co. 325 Savage Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Schauer Machine Co. 265 Scheur Co., George 235-241 Schert Co., George 235-241 Schert Co., George 245-245	Wade Tool Company 2	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robe Co., David J. 174 Rotary File Co. 134 Rotor Tool Co. 177 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Savwage Tool Co. 305 Savwage Tool & Machine Co. 182 Schauer Machiner Co. 265 Seleter Co., Coorge 235-241 Schert Co., George 235-241 Schert Co., George 345 Secil Machinery Co. 348 Secil Machinery Co. 348 Seleter Co., Coorge 348 Seleter Co., Coorge 348 Seleter Co., 348 Seleter Seleter Co. 348 Seleter Co., 348 Seleter Seleter Co. 348 Seleter Seleter Co. 348 Seleter Co., 348 Seleter Seleter Co. 348 Seleter Seleter Co. 348 Seleter Seleter Co. 348 Seleter Selet	Wade Tool Company 2	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115	Wade Tool Company W 2 Wagner Electric Corp. 18- Walker-Turner Co 18- Wall-Colonony Corp. 1 Wall-Colonony Corp. 2 Waitham Dial Gage Co. 2 Waitham Dial Gage Co. 2 Wardwell Mig. Co. 2 Weich Industries Inc. 78- Weidex, Inc. 2 Westley Rous Elec. & Mig. Co. 2 Westlof Tool & Die Co. 1 West Penn Machinery Co. 3 White Destal Mig. Co., S. S. 3 White Machinery Co. 3 Winglesworth Mechy. Co. 3 Wigglesworth Mchry. Co. 3 Willey's Carbide Tool Co. 2 Willey's Carbide Tool Co. 2 Willey's Carbide Tool Co. 2 Witck Mig. Co. 1 Wright, Inc., L. G. 2 Wyenbeek & Staff, Inc. 2	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 19 26 30 73 36 97 22 38 25 02 10 32 54 45 44
Rogers Machine Works 115	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 19 26 30 73 36 29 29 20 20 32 44 44 46 31 32 43 36 43 36 43 36 43
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Rose Co., David J. 174 Rotary File Co. 134 Rotary File Co. 137 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ruthman Machinery Co. 72 Ryerson & Sou, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 305 Savage Tool Co. 305 Savway Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Sepal Machinery Sales 345 Segal Machinery Co. 300 Selfers & Co., Wm. 274 Severance Tool Co. 300 Selfers & Co., Wm. 274 Severance Tool Co. 286 Sheldon Machine Co. 145 Severance Tool Co. 286 Sheldon Machine Co. 171 Severance Tool Co. 286 Sheldon Machine Co. 171 Segman Machiner Co. 171 Siggman Machiner Co. 299 Simmons Machiner Co. 299 Simmons Machiner Tool Corp. 37-109	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 19 26 30 73 36 29 29 20 20 32 44 44 46 31 32 43 36 43 36 43 36 43
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Rose Co., David J. 174 Rotary File Co. 134 Rotary File Co. 137 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machinery Co. 72 Ruthman Machinery Co. 72 Ryerson & Sou, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 305 Savage Tool Co. 305 Savway Tool & Machine Co. 182 Schauer Machine Co. 265 Schauer Machine Co. 265 Sepal Machinery Sales 345 Segal Machinery Co. 300 Selfers & Co., Wm. 274 Severance Tool Co. 300 Selfers & Co., Wm. 274 Severance Tool Co. 286 Sheldon Machine Co. 145 Severance Tool Co. 286 Sheldon Machine Co. 171 Severance Tool Co. 286 Sheldon Machine Co. 171 Segman Machiner Co. 171 Siggman Machiner Co. 299 Simmons Machiner Co. 299 Simmons Machiner Tool Corp. 37-109	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 126 30 73 36 92 23 32 32 32 44 46 31 26 43 32 43 32 43 32
Rogers Machine Works 115 Rogers & Co., Saml. C. 265 Rollins Engineering Co. 313 Robert David J. 174 Rotary File Co. 134 Rotary File Co. 137 Rusnok Tool Works 288 Russell Machine Co. 307 Ruthman Machiner Co. 307 Ruthman Machiner Co. 72 Ryerson & Son, Inc., Jos. T. 44 S. & S. Machine Works 283 Savage Tool Co. 315 Sav-Way Tool & Machine Co. 182 Schauser Machiner Co. 265 Schauser Machiner Co. 265 Schauser Machiner Co. 308 Schuner Machiner Co. 308 Schuner Machiner Co. 308 Selden Roumain Co. 348 Selden Freumain Co. 348 Selden Freumain Co. 348 Selden Freumain Tool Co. 300 Sellers & Co., Wm. 274 Seneca Falls Machine Co. 145 Severance Tool Co. 286 Sheldon Machine Co. 171 Selgeman Machine Co. 171 Selgeman Machiner Co. 308 Sigourney Tool Co. 37109	Wade Tool Company Wagner Electric Corp. 18- Walker-Turner Co	70 1962 1962 1962 1962 1962 1962 1962 1962



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